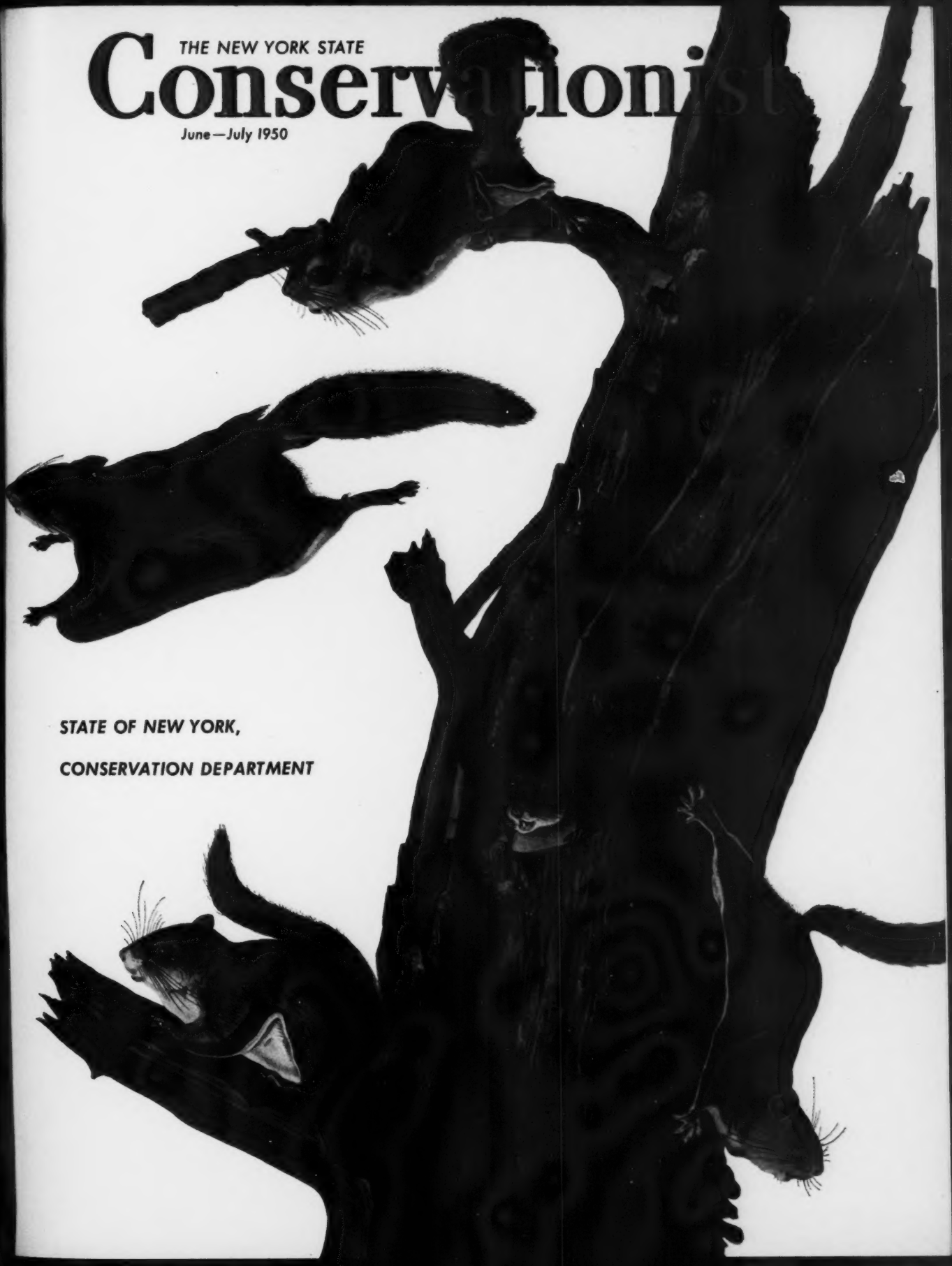
THE NEW YORK STATE

Conservationist

June—July 1950



STATE OF NEW YORK,

CONSERVATION DEPARTMENT

AFTER FOUR YEARS

With this issue, The Conservationist completes its fourth year of publication. It seems a good time to ask, How are we doing?

We may as well state at the outset that we've had opposition in some quarters, which will doubtless continue. But this has come mainly from groups opposed to the idea of Conservation Education in general—opposed, in fact, to just about all the major programs of the Department, and to the Department itself —and we just haven't had the time or inclination to pay much attention to this sort of opposition. We still haven't.

Then there are some who have been disappointed. because. the. magazine .hasn't. had enough in it about hunting and fishing, how to take bigger fish and more game. Well, we don't like to disappoint anybody and we wish the best of luck to all real sportsmen, but this just isn't a hunting and fishing magazine. It's a magazine about the wise use of natural resources in New York.

Sorry, but we don't think we ought to plan a change here, either.

We are glad to report, however, that most of the complaints addressed to us are from subscribers who want to know when we're going to put out the magazine at least once a month. This makes us highly nervous, as we already work up a nice lather putting it out half as often as that, but of course we're very pleased to know that our product is in good demand. And it really seems to be; our circulation is almost four times what it was two years ago, and the only people who have been really pushing it are our subscribers themselves, who tell their friends. For that, many thanks.

But the most encouraging aspect of this sort of support, as we interpret it, is simply this: the magazine wouldn't be taking ahold unless Conservation were taking ahold along with it. Our primary purpose was never to sell a magazine; it was to sell Conservation via a magazine. And—as we start on our fifth year—it looks like we're really doing it.—Editor.

TO SUBSCRIBE

Print clearly your name, street and number, city and state, and send this address with $1.00 (check, money order, or cash at sender's risk) to The Conservationist, N. Y. S. Conservation Dept., Albany 1, N. Y.

NO STAMPS, PLEASE

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STATE OF NEW YORK
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Liquid Assets

IT is common knowledge that the City of New York now faces—and will probably continue to face for some time to come—a critical shortage of water. This situation has been more than adequately covered in the metropolitan papers, and elsewhere, and it is neither the province nor the purpose of this magazine to comment upon those aspects of the situation which are strictly the City's business, and not ours.

Nevertheless, as the City reaches out for new sources of supply it moves into an area (both geographic and theoretical) in which the Conservation Department has definite responsibilities and interests. In the first place, before the City can build new reservoirs they must be approved by the Division of Water Power and Control—a subdivision of the Conservation Department. And in the second place, as new dams are built and new watersheds tapped in the Catskills, great alterations are inevitably being made in a region which sportsmen and all outdoor people have cherished for many years—and the Conservation Department is morally and legally bound to protect the interests of these people.

Obviously, there is a conflict here which is difficult to resolve. The City's need for water is a primary need, and must be met. On the other hand, in meeting it the greatest care must be taken to protect the recreational values of the waters and watersheds affected. It is difficult to estimate these values, but it may be worth pointing out that half of the State's total population, and perhaps a third of its users of the outdoors, live in the City of New York; for them, the Catskill region is the only convenient major playground.

Years ago, when the Catskill system was started, these recreational values, and the corresponding economic importance of the Catskill resort business, were not and perhaps could not have been fully appreciated. Today, they are. For the first time the Conservation Department and the New York City Board of Water Supply are working together on definite plans designed to safeguard fisheries and other recreational assets to the fullest possible extent. Much credit is due Major Huie, Chairman of the Board, and his associates for their co-operation. And, Cecil Heacox, our head biologist for the region, working on special assignment, has done a pioneer job in representing the interests and obligations of this Department. His article presents the first complete outline of the problem.

—Perry B. Duryea, *Commissioner*

WATER is the lifeblood of civilization. An adequate supply of water, of the right kind and at the right time and in the right place, is one of the most pressing problems confronting mankind today. Nowhere in this country is the problem more urgent than in the world's largest city—New York.

In its attempts to solve this problem, the City is today reaching out still further into one of the Empire State's most water-rich areas — the Catskills. New reservoirs are building, others are proposed.

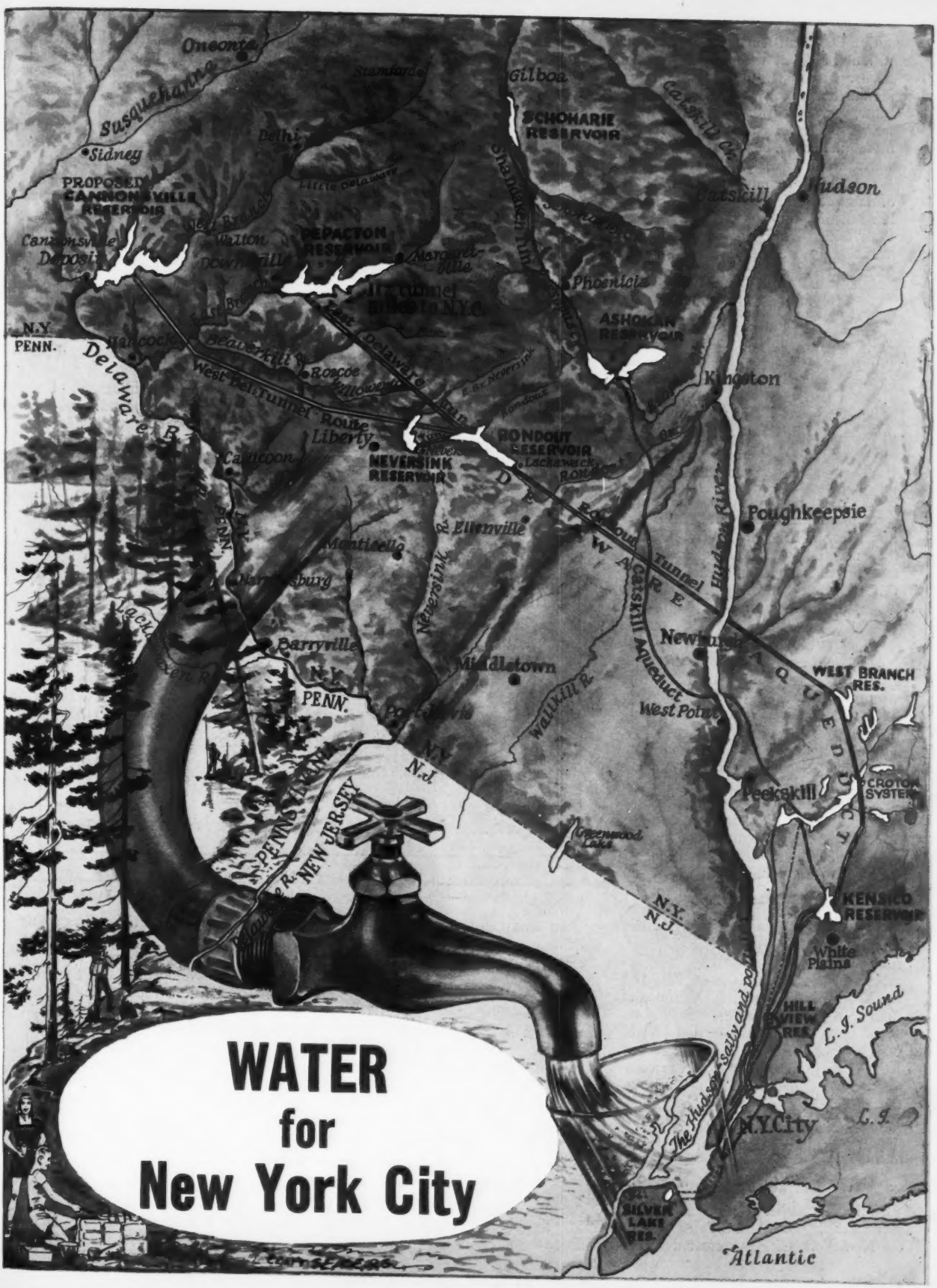
But the same streams that feed these reservoirs, or will feed them, are known to trout fishermen all over the world. And the same watersheds that are drained by these streams have been a happy hunting ground for centuries, and a traditional playground for the camper, the hiker, and the person who simply likes to be outdoors in good country.

On the surface, the engulfing of this region by a City-owned reservoir system, with City-owned watershed lands surrounding the reservoirs, would seem to have an ominous portent. Certainly great changes are in the making; miles of stream, as well as thousands of acres of land, are in the process of being swallowed up. The geography of the Catskill region is being changed, and therefore there will follow some changes in the general character of the region and in the uses to which the region has been put.

But there is an opportunity in these changes. It is not too much to imagine that the reservoirs will provide the City with the pure water it must have; that in the reservoirs there will be a balanced and properly managed fish population awaiting the angler; that the streams feeding into these reservoirs will be preserved as trout streams by the erection of barrier dams, and that the streams below the reservoirs will be guaranteed a constant flow of good water; that the lands around these reservoirs will be managed forests, with food and cover for wildlife and an opportunity for the hunter, campsites for the camper, trails for the hiker, picnic areas for the City family with just a few hours off.

This is the idea of multiple use. It definitely is not a mere hope, or vision, or pipedream. It is possible, first, because your Conservation Department is thinking and planning in these terms, and second, because in this thinking and planning we have met with a sympathetic response from City officials who, although their primary responsibility is to provide their people with water, have nevertheless taken a broad view of the situation; as we shall see, they have already made many concessions in the interest of this idea of multiple use.

It is to be hoped, and it is expected that this give-and-take will continue. If the ideal of multiple use of the reservoir system, as we outlined it above, is to be realized, then we of the Conser-


Oneonta
Susquehanna
Sidney
Delhi
Stamford
Gilboa
SCHOHARIE RESERVOIR
Catskill Cr.
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Hudson
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Cannonsville Deposit
PEPACTON RESERVOIR
Margaret-ville
Shandaken Tunnel
Phoenicia
ASHOKAN RESERVOIR
Kingston
N.Y. PENN.
Hancock
Delaware R.
Beaverkill
Roscoe
West Delaware Tunnel Route
Liberty
Callicoon
NEVERSINK RESERVOIR
RONDOUT RESERVOIR
Lackawack
Rondout
Poughkeepsie
Mentiecello
Neversink R.
Ellenville
Rondout Catskill Aqueduct
Hudson River
Newburgh
Middletown
Port Jervis
Wallkill R.
West Point
AQUEDUCT
WEST BRANCH RES.
Peekskill
CROTON SYSTEM
PENN.
N.Y.
N.J.
PENNSYLVANIA
NEW JERSEY
Greenwood Lake
KENSICO RESERVOIR
White Plains
HILL VIEW RES.
L.I. Sound
The Hudson Salt and Pepper
N.Y.City
L.I.
SILVER LAKE RES.
Atlantic
WATER
for
New York City

vation Department must take full recognition of New York City's problems and needs. In turn, the City must appreciate our obligations to the people of the State, particularly in a region where we are the legal custodians of slightly more than 200,000 acres of land and water owned by the people of the State.

First, then, we must understand each other's problems and plans. What are some of the problems and plans of New York City? And what are the problems and plans of the Conservation Department?

THE CITY'S PROBLEM

Let's take Father Knickerbocker's water worry first. It's not a new one, and yesterday's story may help us understand today's problem—which is a problem that goes back to the original Dutch settlers and the first public well in front of the old fort at Bowling Green in 1677. This well appears to enjoy the distinction of having been the first of many public water systems which the City sooner or later found inadequate, but it was not until a century later, in 1776, that New York, by then a thriving community of 22,000, constructed its first public storage reservoir on lower Broadway, using hollow logs as distribution pipes.

Croton System

Dug wells continued to be the main source of supply until, in 1842, the Croton Aqueduct (now the Old Croton Aqueduct) was built to bring Croton River water to the growing City. The Croton System was gradually enlarged and a second aqueduct from the Croton watershed was finished in 1893. By 1900, the expanded Croton System consisted of seven reservoirs and six lakes, yet greater supplies were needed.

In 1902, for the first time, thoughts were given to a definite long-range program to care for the City's future water needs. A commission was formed to make a comprehensive survey. After considering the Hudson River itself, such streams as Fishkill Creek, Wappinger Creek, Roeliff Jansen Kill and the Kinderhook east of the Hudson, and numerous streams west of the Hudson as far as the Susquehanna, and several places in the Adirondacks, and even Lake Ontario and Lake Erie, the commission recommended the upland waters of the Catskill region as the best source of supply. A fateful recommendation, and one having the effect of a commitment for the future.

Catskill System

In 1905, another organizational step was taken; a Board of Water Supply for New York City was created by an act of the State Legislature. [And this is a good place to clear up the confusion on two agencies: (1) the New York City Board of Water Supply and (2) the New York City Department of Water Supply, Gas and Electricity. The Board of Water Supply is charged with the planning and construction of additions to the City's water supply. When completed, such additions are turned over for maintenance and operation to the Department of Water Supply, Gas and Electricity—a municipal administrative agency.]

The new Board of Water Supply selected Esopus Creek for a huge reservoir—and Ashokan was built. The same plan also called for the enlargement of Kensico Lake, the two reservoirs to be connected by a 74-mile aqueduct, and the complete set-up (the Catskill System) was put into operation in 1915. In 1926, the system was enlarged by the completion of a reservoir on Schoharie Creek at Gilboa. Water from the Schoharie Reservoir is diverted to the Catskill System via the Shandaken Tunnel; the tunnel brings water to the Esopus Creek, where it moves by natural stream flow to Ashokan.

But the enlargement of the Catskill System did not end New York City's water problem. The population was now nearly 7,000,000 and the daily consumption 863,000,000 gallons; the need to plan for the future was as great as ever.

Delaware System

As far back as 1921, the Board of Water Supply had begun to investigate additional sources, and in 1928 it submitted a plan recommending the upper portion of Rondout Creek and tributaries of the Delaware River lying wholly within New York State as the most available and economical sources of supply. The plans were approved by the State Water Power and Control Commission on May 25, 1929.

Even before this approval, however, there occurred the first of three developments which, taken together, give a pretty fair picture of what the City has had to contend with in solving its water problems: the State of New Jersey began an action in the Supreme Court of the United States to prevent the City from diverting water from the Delaware River and its tributaries. After proceedings before a Special Master, the Court granted to the City the right to divert 440 million gallons per day, but not the 660 m.g.d. requested. Furthermore, the City was obliged to adhere to certain provisions regarding release waters and sewage treatment.

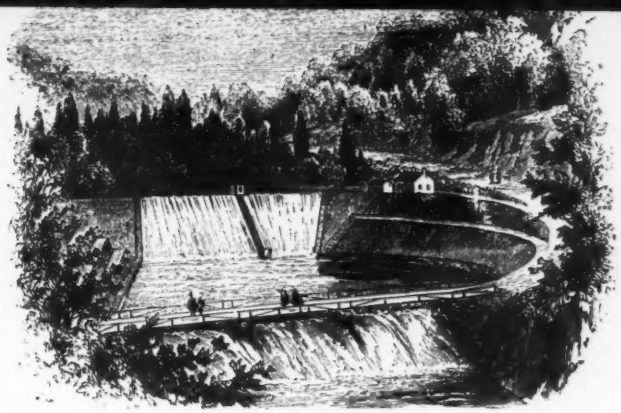
Then, with court approval obtained, a new hitch developed. Came the great October crash and the ensuing depression, and the City had no money for such projects as reservoirs on the Rondout, the Neversink and the East Branch of the Delaware. Sufficient funds became available in 1937, and thereafter work progressed satisfactorily until the third major interruption—Pearl Harbor.

As a result of the war's beginning, the Merriman Dam contract on the Rondout was terminated in 1942. It was, however, possible to effect an emergency operation of the Delaware Aqueduct, and temporary structures have made it possible to take Rondout Creek

CONSUMPTION OF WATER IN NEW YORK CITY

Per Capita Consumption Expressed in Gallons Daily: Other Figures in Million Gallons Daily

Year	Population	CONSUMPTION			
		Mun.	Priv. Co's.	Total	Per Capita.
1898.....	3,272,418	325.0	23.1	348.1	106.4
1903.....	3,781,423	397.6	25.7	423.3	111.9
1908.....	4,469,248	480.0	38.6	518.6	116.0
1913.....	5,048,827	463.6	35.5	499.1	98.9
1918.....	5,488,222	616.0	43.2	659.2	120.1
1923.....	6,067,117	723.3	38.3	761.6	125.5
1928.....	6,706,737	825.2	52.6	877.8	130.9
1933.....	7,101,000	880.7	57.8	938.5	132.2
1938.....	7,363,000	920.3	60.0	980.3	133.1
1943.....	7,060,000	879.5	63.2	942.7	133.5
1948.....	7,917,000	1128.5	43.8	1172.3	148.1



Old Croton Dam

water without benefit of storage. This flow is taken directly to the West Branch Reservoir in the Croton System and thence to Kensico and the City.

This is the status of the Delaware System at the present time. Since the end of the war, work has been resumed on the Rondout Reservoir and started on the Neversink and East Branch projects.

Yes, the job of providing New York City with water is full of headaches and heartaches. Besides the engineering details, other difficulties, often just as formidable, are invariably present. There's budget approval, numerous public hearings and sometimes, as we have seen, court action. There is also the problem of displaced persons—a tragic one. In the face of the relentless encroachment of civilization, there doesn't seem to be a wholly satisfactory answer to this one, but the fairest way—the usual way—is generous indemnity compensation.

But the Supreme Court has said: "A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it."

Cost—and Waste

Besides being complicated, supplying New York City with water is costly. About $800,000,000 has been spent by the City on water works to date; projects under construction have a bid value of $120,000,000; and operation and maintenance costs are approximately $8,000,000 annually.

Costs bring up the question of waste. Which brings up metering. Every water engineer recognizes the value of meters; it's just good business to know where the water goes, and meters save water, lots of it. But are they the sole answer, as many think, to the City's water problem and if installed would they eliminate the necessity for additional sources of supply? In other words, "*Could we save the Catskills by installing meters?*"

Substantially all water used for commercial and industrial purposes in the City is metered; last year 183,482 meters were in use. It is agreed that 100 per cent metering is desirable, but in view of the large number of apartment houses and tenements the cost would be staggering—and the saving of doubtful significance in proportion. Besides, a glance at the table on this page will reveal that some metered cities have a higher per capita consumption than New York.

Before the recent water conservation campaign, New York's daily per capita consumption was 148 gallons. Chicago, with about the same amount of metering as New York, has a daily per capita consumption of 234 gallons. Cleveland, over 99% metered is rated at 187, while Boston, pride of the metering advocates, uses only 117 gallons a day per person. Water engineers are quick to point out that a lot depends on the city. Chicago, for instance, must use a tremendous amount of water in its stockyards, and it has an almost unlimited supply in nearby Lake Michigan.

To sum up: meters *should be* installed. But wise planning for the City's increase in population (it's expected to be 10,000,000 in the year 2000) and the inevitable increase in consumption is also necessary.

Besides quantity, there's the matter of quality. New York City's water supply, like others, must meet Federal and State Department of Health standards. Certification on purity is required at periodic intervals, and several laboratories and a sizable staff of chemists and biologists are required to insure water of the highest quality.

Future Supplies

But the main problem is always that of an adequate supply. During severe droughts, a water shortage for New Yorkers is always imminent. Right now, the Board of Water Supply has plans for the future. An application has been made to the State Water Power and Control Commission for permission to build a new reservoir on the West Branch of the Delaware River near Cannonsville. This addition would connect with the Rondout Reservoir by a 44-mile tunnel.

Pending completion of the Delaware System, a plan has been evolved to tap the Hudson River (near Chelsea, where an aqueduct already crosses under the river) for an emergency water supply. The plan was approved by the State Water Power and Control Commission on January 16, 1950, and construction, already under way, is expected to be completed within the year. When finished, it will be possible, if necessary, to pump 100 million gallons per day of Hudson River water into the Delaware Aqueduct.

You will recall that the Hudson River has been considered by the City as a source of supply several times in the past but always has been rejected in favor of other sources regarded as more satisfactory. Heavy pollution below the Troy dam and a high saline content in the lower reaches are two serious drawbacks. It is hoped that: (1) super-chlorination and coagulating treatment before the water enters the Aqueduct, (2) mixture with high quality Croton and Catskill water, (3) storage in West Branch and Kensico reservoirs, and (4) further treatment at various points before the water reaches the distribution mains will render this additional water satisfactory for human consumption.

The Citizen's Budget Commission, an organization of private citizens in the metropolis, feels that the Hudson should again be considered as an alternative to further expansion of the Delaware System, and not just as a small scale relief measure. Their proposal "is for the regulation of the Hudson River by the erection of a barrage or gate-pierced dam at one of two places be-

WATER CONSUMPTION IN 1948

CITY	Per cent Metered	Per Capita Consumption Gallons per day.
NEW YORK	26.55	148
Baltimore	45.38	169
Boston	99.79	117
Chicago	27.55	234
Cleveland	99.5	187
Detroit	99.0	147
Los Angeles	100.0	151
Philadelphia	52.7	168
St. Louis	9.67	192

tween Chelsea and Haverstraw. The flow of river traffic would be accommodated by appropriate locks. The barrage would raise the level of the river approximately three feet above mean high water level thereby creating the necessary head for regulating purposes and, at the same time, preventing the entry of salt water to the reaches of the river above the barrage."

This plan is now being studied carefully by all agencies concerned, including the State Water Power and Control Commission.

Incodel

Another agency of importance in the light of New York City's future water supply is the Interstate Commission on the Delaware River Basin. This Commission, known as Incodel, has representation from New York, New Jersey, Pennsylvania and Delaware. Incodel is engaged in the formulation and execution of a co-ordinated, unified plan looking toward the wise use, development and control of the resources of the Delaware River Basin as a whole. Incodel's project provides for stream regulation from mouth to source and considers water supply, hydraulic power, pollution, salinity control, commercial and recreational fishing and all other possible aspects involved.

Incodel has engaged the services of consulting engineers to develop a plan which would provide water not only for New York City but also the communities of Northern Jersey and, eventually, Philadelphia, Camden, Wilmington and other municipalities in the lower Delaware River area. In other words, it is a comprehensive plan as contrasted with piecemeal work by the individual states.

It is interesting to note that Incodel's preliminary plans provide for a series of three reservoirs, one of which is a dam near Cannonsville on the West Branch of the Delaware. In other words, its location would be the same as that of the dam which New York City now has under consideration. The same reservoir could be incorporated into the Incodel plan, even if work is started by the City in the interim. It is expected that Incodel will present its final plan by the autumn of 1950.

THE DEPARTMENT'S PROBLEMS

Although all phases of recreation enter into the picture, New York City's problems and plans are of particular interest to the Conservation Department because the areas affected include some of the State's most important fishing waters. Most important, because they are or have been among the most productive, and because they provide fishing opportunity within easy reach of the metropolitan area, where the demand is enormous.

THE FISHERIES SITUATION

ABBREVIATIONS

N.S.A. — Natural Spawning Adequate.

B.T. — Brown Trout
R.T. — Rainbow Trout
S.T. — Brook Trout
L.T. — Lake Trout
Lm.B. — Largemouth Bass
Sm.B. — Smallmouth Bass
R.B. — Rock Bass
Co.B. — Calico Bass
W.P. — White Perch
Y.P. — Yellow Perch
Pp. — Pike-Perch
Cs. — Cisco
Cm.S. — Common Sunfish
Rb.S. — Red-bellied Sunfish
Bg.S. — Bluegill Sunfish
S.S. — Spotted Sunfish
G.S. — Green Sunfish
G. Sh. — Golden Shiner
Mumchg. — Mummichog
Bh.C. — Bullhead Catfish
Wf. — Whitefish
Ch.Skr. — Chub Sucker
Cm.Skr. — Common Sucker
J.Dtr. — Johnny Darter.
Pkl. — Chain Pickerel
B.Pkl. — Banded Pickerel
Kilfsh. — Killifish
B.Kilfsh. — Barred Killifish

Reservoir	Year Placed in Service	Surface Areas (Acres)	Storage in Millions of Gallons	Principal Fish Species Present	Fish Management
Boyds Corner	1873	279	1,695	W. P., Y. P., Lm.B., Com. Skr., G.Sh., Bh.C., J.Dtr., Sm.B., Rb.S., Cm.S., Kilfsh.	Sm. B. stocked irregularly.
Middle Branch	1878	430	4,145	W.P., Lm.B., Cm.S., Bh.C., B.Pkl., Pkl., Y.P., Sm.B., Rb.S., R.B., Carp, J.Dtr. minnows.	All species N.S.A.
East Branch	1891	553	5,243	W.P., Y.P., J.Dtr., Lm.B., Cm.S., Cm.Skr., Carp, G.Sh., Bh.C., Pkl., Sm.B., Rb.S., B.T., S.T., Bg.S., minnows.	All species N.S.A.
Bog Brook	1892	.....	4,400	No survey yet.	All species N.S.A.
West Branch	1895	998	10,427	W.P., Cm.S., Eel, Lm.B., Rb.S., Bg.S., G.Sh., Bh.C., Y.P., J.Dtr., Pkl., B.Pkl., Sm.B., R.B., Ch.Skr., Mumchg., Kilfsh., B.Kilfsh., B.T., S.T.	All species N.S.A.
Amawalk	1897	602	7,070	Lm.B., Sm.B., Rb.S., Cm.S., Y.P., W.P., R.B., Bh.C., G.Sh., eel, Cm.Skr., Carp, Ch. Skr., J.Dtr., minnows	Sm. B. stocked irregularly. Other fish N.S.A.
Croton Falls	1911	1,066	14,839	Lm.B., Cm.S., Carp, W.P., Y.P., Sm.B., Rb.S., Cm.Skr., Bh.C., Pkl., Bg.S., R.B., B.Pkl., J.Dtr., B.T. and minnows.	All species N.S.A.
Croton Falls Diverting	1911	.....	888	No survey yet.	All species N.S.A.

The Record, Up to Now

At present there are nearly 24,000 acres of lakes and reservoirs and several hundred miles of stream in the City's water supply system. The Rondout, Neversink and East Branch reservoirs will add about 10,000 more acres. The right of the public to fish on these waters (subject to certain restrictions) was secured in 1905, when the State Legislature passed a law permitting fishing (also boating and ice cutting) on any natural lake or any reservoir that New York City might use or build for water supply purposes. This, of course, was a most significant milestone in the State's angling history.

Another welcome development is of much more recent date, and is a result of the Conservation Department's current activities in behalf of fishing interests. As reported in the last issue of THE CONSERVATIONIST, at a public hearing conducted by the Water Power and Control Commission this spring

IN THE CITY'S RESERVOIRS

Reservoir	Year Placed in Service	Surface Areas (Acres)	Storage in Millions of Gallons	Principal Fish Species Present	Fish Management
Titicus	1893	725	7,599	Y.P., Lm.B., G.Sh., Cm.S., Cm.Skr., Bh.C., Pkl., W.P. Sm.B., R.B.	All species N.S.A.
Cross River	1908	934	10,898	Lm.B., Sm.B., Co.B., Cm.S., Rb.S., Bg.S., W.P., Y.P., Pkl., Bh.C., S.T., B.T., R.T. & minnows.	Exp. Plant approx. 5000 adult B.T. annually.
New Croton (includes Muscoot Reservoir)	1905	4,733	28,110	W.P., Y.P., Carp, G.Sh.' J.Dtr., Lm.B., Bg.S., Cm.S., Cm.Skr., Bh.C., Pkl., Eel, Sm.B., R.B., G.S., B.Pkl. & minnows.	All species N.S.A.
Lake Mahopac	1870	560	575	W.P., Y.P., J.Dtr., Sm.B., Lm.B., Rb.S., Cm.S., R.B., G.Sh., Co.B., Bh.C., B.Pkl.	All species N.S.A.
Lake Kirk	1870	101	565	Lm.B., Sm.B., R.B., Y.P., W.P., Cm.S., G.Sh., Bh.C., B.T.	All species N.S.A.
Lake Glenida	1870	185	165	Lm.B., RbS., Cm.S., R.B., Y.P., Sm.B., Wf., L.T., G.Sh., Pkl., Bh.C., Mumchg., B.Kilfsh., Kilfsh, J. Dtr., eel.	Experimental planting of R.T. and creel census
Lake Gilead	1870	121	380	L.T., Rb.S., Cm.S., Pkl., Kilfsh., Sm.B., Lm.B., Bg.S.	Same as for Lake Glenida
Barrett's Pond.	1870	69	170	Sm.B., Pkl., Rb.S., Y.P.	All species N.S.A.
White Pond	1896	115	200	W.P., Lm.B., Y.P., Co.B., Cm.S., Rb.S., SS., Pkl., G.Sh., Bh.C., Sm.B.	All species N.S.A.
Kensico	1915	2,218	30,573	Cm.S., Y.P., Sm.B., Lm.B., R.B., W.P., Pkl., Bg.S., Cm.S., Bh.C., Cisco, Cm.-Skr., B.T., R.T., L.T., S.T.	Re-survey completed
Ashokan	1915	8,315	130,478	Sm.B., Pp., Y.P., Bh.C., Cm.S., R.B., G.Sh., Pkl., Cm.Skr., Kilfsh, Carp, B.T., R.T. & minnows.	All species N.S.A.
Schoharie	1926	1,142	19,583	Pp., Sm.B., Cm.S., Bh.C., Pkl., Cm.Skr. and minnows.	All species N.S.A.

Fifth Avenue Reservoir

representatives of the City officially stated that (1) they would agree to the construction, at City expense, of barrier dams to protect the fishing in tributary streams above the proposed Cannonsville reservoir, wherever such dams can be built on City-owned property; (2) sufficient water from this reservoir and from other projects now under construction will be released to maintain a certain minimum flow in the streams below the reservoirs; and (3) the Board of Water Supply was no longer interested in the Beaverkill, Willowemoc and Little Delaware as sources of water supply.

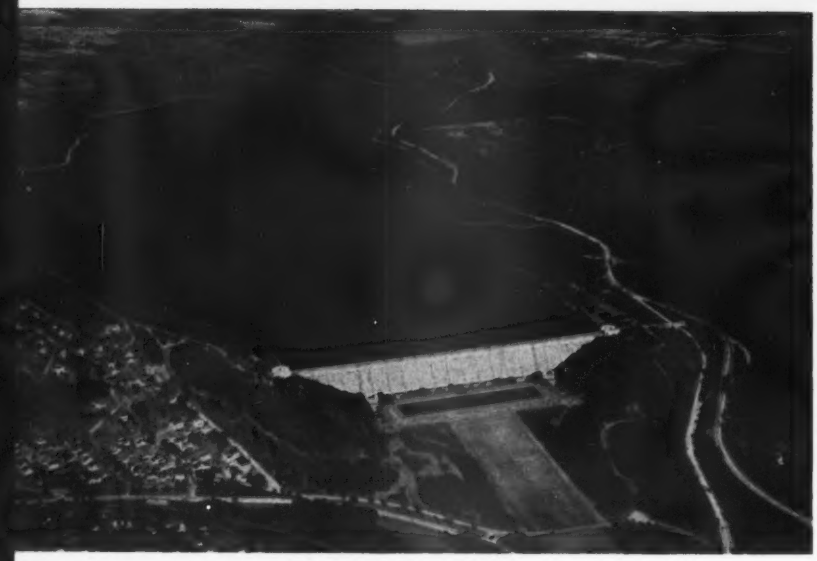
Perhaps the most encouraging aspect of these agreements is the co-operation and mutual understanding which they indicate. But it may be even more significant that this progress is being made *at the planning stage*, when sound fish management features can be incorporated in the actual construction plans.

Fish Management

But it is one thing to permit and protect fishing; another, to provide it. The vast amount of water in the City's reservoir system brings plenty of fish management problems:

As a starting point, we find that reservoirs are usually not as productive as natural lakes. There are exceptions, of course—Sacandaga, very large, and Erieville, very small, come to mind. But in building a reservoir, an engineer's primary thought is maximum storage capacity. Therefore, there is as little marginal shoal as possible. The shore line usually drops off rather sharply, which is fine for water supply, but not so good for fish life. A fisheries' manager would prefer an extensive shoal all around the reservoir and extending well out from the shore line. This shoal is the "fish food factory." When forage production is limited, so is the fish carrying capacity.

Old Croton Aqueduct



Kensico

Another fish management problem common to reservoirs is fluctuating water level. Fisheries' managers have long recognized a fluctuating water level as one of the most serious limitations in the production of fish life. As the water level drops not only is the fish-carrying capacity reduced as far as actual cubic content is concerned, but that important marginal shoal area is exposed and dries up, and countless organisms used by fish as food are destroyed.

Further, some reservoirs have such a heavy, continuous draught that there is scant opportunity for the water to build up in productivity. With such a short retention period, there is little "dead water" storage. Thus, microscopic organisms, the principal fish forage produced in this deeper water, haven't much chance to reproduce and multiply. These microscopic organisms, often called the "basic fertility" of water, initiate the fish food chain and when a reduction in abundance occurs the entire food supply is reduced. It follows that the fish population is also reduced accordingly.

Kensico Reservoir offers an example of this condition. Formerly there was only one main aqueduct—the Catskill —drawing off water. Now the Delaware Aqueduct is in partial operation. (White Plains and several other Westchester communities also take water from Kensico.) In 1930, the average daily draught in Kensico was 587 million gallons; in 1945, three years after the Delaware Aqueduct was in limited use, the daily draught had increased to 750 million gallons; and during the first part of 1949 (before water conservation began) the average daily draught was 815 million gallons. The net result is that during the summer, the total storage capacity of Kensico, 30,000,000,000 gallons, is drawn off in a little over a month. This tremendous use has caused record fluctuations. Last year, for example, the water level dropped 26 feet below crest level —the lowest in history. With these conditions in mind, it can be readily understood why Kensico is not as productive as it was a decade ago.

Engineer vs Fish Manager

The chemical treatment of water supplies brings another problem to the fisheries' manager. This is a routine procedure in New York City's operations. To insure water of the highest quality coming into the city, treatment is especially intensive at the end units of each system, i.e., New Croton Reservoir in the Croton System and Kensico in the Catskill System.

Chlorine and copper sulphate are used regularly, both toxic to fish. Dosages are so diluted, however, that trouble is seldom experienced with actual fish kills. The difficulty is much more fundamental. Chemical treatment is used to destroy undesirable organisms some of which, like the bacteria *Bacillus coli*, cause disease in humans, and some, like the protozoa *Synura* and *Dinobyron* (Dinny O'Brien to all water engineers) have unpleasant smells and tastes. While these organisms are not desirable in drinking water, they are an excellent source of food for all young fish as well as for the adults of such plankton-feeders as the sawbelly, cisco and white perch.

Here, the water engineer's ideal of sterile water and the fisheries manager's ideal of great productivity are difficult to reconcile. But there is an encouraging note in this picture as far as the new Delaware System reservoirs are concerned; chemical treatment will not be required, since they will be above, and will feed into, reservoirs where such treatment takes place. For the same reason, it is not necessary to treat Schoharie and Ashokan water in the Catskill System, as this water is not treated until it leaves Ashokan via the Catskill Aqueduct.

Besides those mentioned above, there are numerous miscellaneous problems. In times of severe drought, for example, reservoir levels often get so low that fish life is actually endangered. Last fall and winter it was a stand-by, round-the-clock situation for possible salvage operations, and in several cases sportsmen's clubs gave invaluable help to the Conservation Department in emergency salvage work.

Dividends from Reservoirs

But in spite of their fish management limitations, New York City's reservoirs provide—and are directly responsible for —a surprising amount of first-rate fishing. It would be difficult to estimate, for instance, the increase in fish-carrying capacity of the present Croton System compared to the amount of fishing available in the original stream mileage.

Another example: it is doubtful if the famous Esopus would be the great trout producer it is without that extra volume of water supplied by the Schoharie Reservoir via the Shandaken Tunnel. For proof, all one has to do is to take a look at the trickle of water coming down the Esopus above the tunnel in the late summer, when the water gets low.

And the Esopus wouldn't have that added dividend of a rainbow run each spring if it weren't connected with the Ashokan Reservoir, where these fish grow to enormous size. But even here, the blessing is not unmixed; that same godsend, the tunnel, brought in pike-perch from the Schoharie. Walleyes are a good fish in their place, but their

place certainly is not a trout stream.

Ashokan Reservoir, too, poses a distinct fish management problem. Does the Dividing Weir, separating the East and West Basins, adversely affect the rainbow fishery as a whole? There is no doubt that the weir often prevents further up-stream progress of ascending fish.

But the real problem is more basic than migration alone. How much natural spawning by rainbows is there? What is the nursery capacity of the Esopus? Will a growing population of rainbows crowd out the brown trout also present? (Ashokan furnished the State's record brown.) How about the comparative growth rate of browns and rainbows, anyway? What is the relative survival of each species? Which species is dominant in actual take by anglers? These and many other questions must be further studied before a sound fish management program can be applied.

Ashokan

Survey Work

Even if the proposed Hudson River barrage dam should be selected as the best source for New York's future water supply, it is doubtful if the fisheries' manager could relax. Each species involved, from such permanent residents as the white perch and catfish to the migratory species—shad, herring, sturgeon, striped bass and eel—has specific requirements. Each reacts somewhat differently to environmental changes. Frankly, fisheries research has not advanced to a point where it can call all the shots in these and similar situations, and it will take much more field work and laboratory study to underwrite acceptable fish management programs which can be adapted to the myriad of aquatic situations which occur in New York waters. The Hudson is only one such situation.

Studies are in progress. Through the Conservation Department's district fisheries offices, surveys of this nature are constantly being made to evaluate fishing waters in the light of changing conditions. It is obvious that the whole New York City water supply picture is such a rapidly changing one, and is so loaded with ramifications, that it is difficult to keep abreast of all developments as they occur. But we are trying.

First, in order to put a new fish management program into effect, it will be necessary to re-survey the Rondout, the Neversink and the East Branch drainages—the water in the area of the future impoundment—to the very headwaters. Not only the main stream, but even the smallest tributaries are part of the picture and must be checked. For the first time, through our district fisheries offices, we have a staff to handle just this kind of job, and the work has begun.

In passing, it should be pointed out to fishermen that the original Statewide Biological Surveys have been of inestimable value in recheck investigations. The sportsmen of the State can be proud that they sponsored this long-time, watershed research, because today, in every new job tackled, the original survey is the springboard for the work to be undertaken.

There are other encouraging angles. We wish to mention again the understanding which has been established between the Conservation Department and the New York City agencies. Each is responsible to different groups which do not and cannot have the same interests and objectives, but the principle of co-operation has already paid off handsomely. New York City's consideration of minimum flows and barrier dams has already been mentioned, as has the saving of the Beaverkill, Willowemoc and Little Delaware. Last year and the year before, the Department of Water Supply, Gas and Electricity kept the West Branch of the Croton River a live stream when, from an operational viewpoint, it would have preferred to shut off water entirely. In this case, the minimum flow was actually determined by a Conservation Department representative and the control valves adjusted in his presence. Such co-operation augurs well for the future.

THE FUTURE

If we have devoted most of our space to the fisheries aspects of New York City's water problem, it is simply because, to date, most of our activities have been in that field. But the Conservation Department is not thinking solely of fish and fishermen. If, as the Supreme Court declared, "A river is more than an amenity; it is a treasure—" then so is the reservoir, formed by damming the river, a treasure—to be shared by all.

The new reservoirs, in their setting of great natural beauty, tapping watersheds in which the State owns more than 200,000 acres of land, could well become the nucleus for the development of a multi-purpose recreational program—a program such as we sketched at the beginning of this article. We have already suggested the advantages of operating such a program within easy reach of the City.

We realize, of course, that the primary function of reservoirs is to provide pure water for the City. But City officials have already recognized that the reservoirs have a secondary function: to provide recreation. So we are off to a good start; we recognize each other's responsibilities and interests.

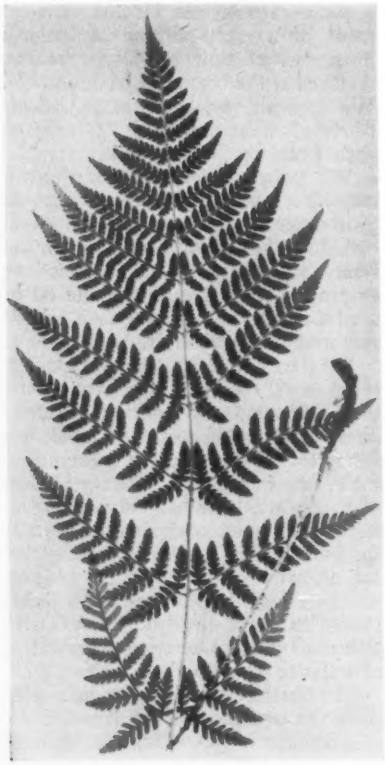
But if we of the Conservation Department are to develop the recreational possibilities to the fullest, the road ahead will not be easy. Conflicting interests will make compromise inevitable. Also inevitable will be a great deal of hard work. Also—if there are to be sites for campers and picnickers, trails for forest walks, managed hunting and fishing, managed forests—there must be adequate facilities and supervisory personnel to insure that the reservoirs retain their primary function as providers of water to the City.

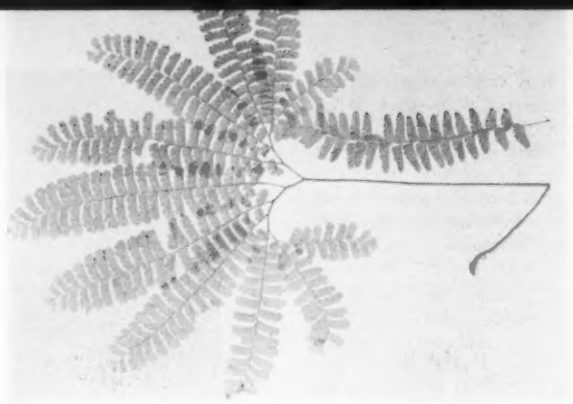
The Conservation Department is prepared to assume its share of this responsibility. —Cecil E. Heacox

The New York Fern

FERNS

Spinulose Shield





Maidenhair

ANY location that will produce more than 15 varieties of ferns is exceptional. New York, with its many gradations of geologic formations—limestones, shales, sands, glacial moraines, rocky hillsides and pock-marked cliffs—produces all the common ferns and many of the really rare ones. Our main purpose in writing this little piece (which is much too short to cover the whole subject) is to suggest that if you know more about New York's ferns, your enjoyment of New York's outdoors would be greatly enhanced.

Because fern varieties are not numerous, it isn't too difficult for the amateur to become acquainted with all those in his area. Incidentally, there are very few mongrel ferns; *rusty woodsia* in England is exactly like its sister in America. That should make the problem of getting to know the ferns even easier.

The ferns were God's first children. They have an ancient lineage, predating the trees and most other living things on earth. They once grew as large as trees—and still do in parts of Australia.

Ferns emerge in the spring in the form of fiddleheads or crosiers curled up tightly in a bundle. The bundles uncoil and expand something like the paper snakes that children blow at parties. A few of these fiddleheads make good food. The *bracken*, for instance, when the fiddleheads are about eight inches high and snap easily in picking, can be cooked like asparagus and served on toast. And the *cinnamon* fern, which emerges from its rootstock as a bundle of fiddleheads, five or six in a cluster, has a heart like the heart of lettuce about the size of a man's thumb, which makes a dainty mouthful eaten raw as salad.

But ferns are mainly beautiful. To this writer, the most beautiful of all is the little *oak fern* which hides in the cool mossy glens of the Adirondacks—in John's Brook Valley and in Indian and Avalanche passes. Its triangular frond supported by an ebony stem and often poking up through a bed of sphagnum moss under old spruces marks it as a true denizen of the North.

Two ferns sure to catch the eye of the New York hiker are the *Christmas* fern, with its shiny thick evergreen fronds, and the *polypody* or rock fern. These two are often confused, but it should be remembered that the *polypody* grows only on ledges and large boulders. But perhaps the most popular of all is the *maidenhair*—a guide to foresters, since it thrives best in the rich humus of hollows where the better species of hardwoods attain their most vigorous growth.

It might interest you to know that New York is one of the two states which lend their names to ferns (Massachusetts is the other). The New York fern (shown at the upper left) is shapely, delicate and easy to identify.

BUT if you really want to know ferns, the thing to do is to buy one of the many good books on the subject and take off on a field trip. Perhaps with a little luck you will locate a new station for the rare *climbing fern*, once common, now all but exterminated by florists. The last known station for this fern in the Catskills was destroyed by collectors; another in Central New York was wiped out by a flood. Right now we know of two secret stations—but maybe you could find another.

—A. T. SHOREY

Christmas Fern

HOW TO DO IT (9): By Ted S. Pettit

Conservation Service Suggestions

I. BRING ABOUT A CHANGE IN POLICY OR PRACTICE ON THE PART OF THREE OR MORE FARMERS, PROPERTY OWNERS, OR SPORTSMEN TOWARD THE WISER USE OF RESOURCES:

A. Crop rotation, strip cropping, contour ploughing, terracing, and other soil conservation practices, where desirable in the light of local conditions.

B. Build reservoirs, farm ponds, and irrigation systems, where desirable in the light of local conditions.

C. Change from burning over fields to ploughing stubble and waste vegetation under, or leaving it to rot as a mulch.

D. Cease practice of grazing or burning over a farm woodlot and manage it for rapid growth and sustained cropping of trees; or, sign as a co-operator under the Forest Practice Act.

E. Develop permanent hedgerows for protection of animal life; plant stream banks to reduce erosion; build fences to exclude livestock except at selected watering places; plant windbreaks and shelterbreaks to prevent erosion; divert water, and plant grasses, vines, and trees to check gullies.

F. Eliminate a definite source of pollution in local waterway, if any exists.

G. Establish shelters for wildlife and provide feeding stations and feed for mammals and birds, depending upon local conditions.

H. Influence farmers or land owners to ask a conservation technician's advice on use and management of his land, and then follow a plan worked out with the conservation expert.

II. HELP START A "GOING" CONSERVATION PROGRAM IN ONE OR MORE ORGANIZATIONS IN THE COMMUNITY, SUCH AS:

A. Prepare and publish an inventory (description and location) of local examples of wise conservation practices (contouring, strip cropping, windbreaks, hedgerows, farm ponds, protection and selective cutting of farm woodlots, etc.); and examples of the misuse of natural resources (erosion gullies, polluted streams, burned over areas, abandoned farms, overgrazing, etc.). Get this inventory used by service clubs and in local schools for demonstrations to members, teachers and pupils.

B. Arrange for meetings to consider conservation needs and methods, using outside experts, motion pictures, and lecturers on conservation.

C. Help start a community forest for the education and recreation of residents of the community.

D. Arouse interest in maintaining wooded sections in the watershed area for the community; or in planting to help protect the water resources.

E. Help develop conservation demonstration areas (woodlot management, erosion control, wildlife management). Use these areas to demonstrate wise conservation methods to individuals and organizations in the community.

F. Breed, rear and release pheasants in suitable areas; rear and stock game fish in clear waters; prevent water pollution; observe protective laws; co-operate with public and private conservation agencies.

G. Prepare charts and exhibits showing why many so-called predatory birds and animals should be protected, pointing out how these animals have a place in maintaining natural conditions (in places where such animals are unwisely persecuted).

H. Help promote a soil conservation district in your area, or if one already exists, enlist additional co-operators.

HOW THESE THINGS MAY BE ACCOMPLISHED

Talk with a local County Agent; representative of the Agricultural Extension Service, the State Conservation Department; the U. S. Forest Service, the Soil Conservation Service, National Park Service; or State, County, or Metropolitan Park Departments; Sportsman's Club officials; Audubon Society representatives; or others, and ask their help in finding specific things which need to be done.

Some of the following activities may suggest conservation projects to be carried out locally.

1. Prepare your own inventory of local examples of wise conservation practices; and local examples of the results of long misuse.
2. Prepare demonstration models or photographic exhibits showing the effects of good and bad local conservation methods.
3. Prepare maps of local streams showing sources of pollution; find out from State Conservation officials the number of fish caught last year and ten years ago and the number annually stocked then and now, and prepare a graph showing the decrease, except for stocking—or the benefit of money spent to improve fishing through the years. Do the same for game animals, and indicate which need more protection.
4. Prepare posters, graphs and exhibits showing the nature and depth of top soil at various places in the community, the effect of erosion and run-off, the various quantities, qualities and values of crops being produced on worked-out soils and on good soils.
5. Interview the editor of your local paper, show him these exhibits, and ask him to publish material on the need for conservation activity and for local civic conservation programs.
6. Interview the officers of local civic clubs and school authorities, and explain from the inventory, maps, graphs, and models what needs to be done in the whole community. Ask their help in starting an active program.

rough it

HOW TO RUIN YOUR VACATION

FIFTY years ago, when our last vacation survey was conducted, it was found that many persons were able to ruin their holidays simply by leaving at home an essential piece of equipment; by the time a return had been made by buckboard wagon to retrieve the article, the vacation time had run out.

However, with the advent of modern transportation, and increased leisure time, even weekends are becoming difficult to lose. In fact, so many bitter complaints have come in to this Department from persons who alleged they had (and we quote) "a glorious time", that finally a committee was selected to work on the problem.

Since the launching of this inquiry into methods of effectively ruining a vacation, considerable research has been done on test cases in controlled areas and the committee assigned has recently submitted a 10,000-page report. This analysis indicates (we are glad to announce at this time) that there is still considerable hope for the person who wishes to wreck his holiday.

The committee first selected an adequate number of persons who in the past had mutilated their vacations sufficiently to allow them to qualify for the experiment. These specimens were quickly isolated into three general divisions: (1) *No-Plan*, or those who created chaos through complete lack of a plan; (2) *Poor-Plan*, those who spoiled their good time by making plans, but poor ones, and (3) *After-Plan*, to be discussed later.

It appears from the report that one of the first prerequisites to proper holiday demolition is unpremeditated departure. Or as one rather uncouth specimen exclaimed during an interview:

"Youse should take off like a big dog wit'out makin' no plans."

Several cases were followed up in this *No-Plan* area and some interesting facts were discovered. It should be noted here that no one was admitted to this group who had taken the trouble to write for any advance information or consulted any local authorities before visiting the holiday area. It was necessary to disqualify two individualists—one who allegedly said to a Game Protector, "How's fishin'?", and one who had actually written to the Conservation Department for a Recreation Circular about the area to be visited. A third, who had wasted a weekend on a personal inspection tour of the area where he intended to spend his two-week vacation, was of course not even considered.

In an on-the-spot interview, one person admitted he had previously camped with annoying success for 30.01649 years. "All at once," he asserted, "I realized the reason. It was my check-off list—a list of all the items I needed for my vacation trip. I had revised it so much that the end result was almost foolproof and I never forgot anything. When I realized this I quit using it, and now I can louse up my vacations along with the best of them."

This gentlemen was kind enough to mail the committee a copy of his list. We are publishing it here only for those interested in the pathogenesis of the situation; would-be vacation wreckers should not even glance at it.

The complete lack of a plan resulted in some interesting culinary ramifications. One outstanding instance concerned the arrival at rendezvous of eight members of a party, each with a case of beans. "The trip was thus well ruin-bound," one member assured the interrogator, "but then one of the party revealed he had been a chef and knew 76 ways to cook beans. Imagine bringing along somebody who knows how to cook! Of course we had to get rid of him."

One reason that the *No-Plan* idea holds a firm place among vacation-spoiling schemes is that the individual has no chance to check his equipment. So he is frequently found back in the woods with fouled spark plugs on an outboard motor or faulty generator in

VACATION CHECK-OFF LIST

- First Aid Kit
- Extra Clothes
  - Raincoat
  - Shoes; Socks
  - Boots; Waders
  - Patching Kit
  - Heavy Underwear
- Sleeping Bag
- Towel, Washcloth
- Dental Necessities
- Razor, etc.
- Needle, Thread
- Dish Towel; Dish Cloth
- Soap; Soap Chips
- Steel Wool
- Groceries, etc.
  - Butter
  - Condiments
  - Bacon
  - Eggs
  - Sugar
  - Bread
  - Milk
  - Paper Towels
  - Tobacco
  - Matches
  - Coffee
  - Tea
- Water Pail
- Frying Pan
- Kettle
- Coffee Pot
- Dish Pan
- Cups
- Eat Tools
- Can Opener (dual purpose)
- Spatula
- Gas Lantern
- Mantles
- Gas Stove
- Gas
- Funnel
- Outboard; Gas Tools; Shear Pins
- Minnow Pail
- Worms
- Landing Net
- Fishing Tackle
- License
- Rope
- Tent
- Ax
- DDT Bomb
- Fly Dope
- Sun Tan Oil
- Flashlight
- Jacknife
- Camera; Film
- Light Meter
- Sun Glasses
- Gun; Shells

—and wreck it

IN ONE EASY LESSON, COMPLETE ON THESE PAGES

a gas lantern. And, of course, since he doesn't get ready to go until he's gone, he arrives with unpatched boots, waders, and boat.

Even though the *No-Plan-At-All* pattern was accorded top listing as a detrimental factor to vacations, the committee cautioned against underestimating the devastating influence of making poor plans. In several isolated cases, it was indicated, those who made poor plans actually created more chaos than persons with no plan whatever.

One characteristic was noted in all Poor Planners: a powerful propensity toward forgetting essentials. Grading of these essentials was extremely difficult but all agreed that the most effective single article to forget was a first aid kit. It was suggested further that anybody seriously bent on spoiling his vacation would find a dull ax the best thing for most cuts and bruises.

Gaining an important place on the list of articles to be forgotten was insect repellent; also receiving high priority was tobacco. The absence of this, in one form or another, has a deleterious effect on the disposition of the smoker, thus ruining the outing by remote control. A curious reaction was noted in one individual who said, "Sure, I always forget them. What better excuse to get me out of the woods to the nearest bar."

Sun tan oil received no little praise as an article to forget. The committee's ruminations indicated, however, that this neglect should be followed up at once by a full day in the hot sun. Several who resorted to this method were interviewed in hospital beds.

One specimen insisted on leaving home without a light. "As a vacation wrecker, it's the nuts," the individual said. This remark was construed as indicating that the person was somewhat enthusiastic about the efficaciousness of forgetting lights as a vacation-wrecking measure. The committee viewed this dimly, however, reflecting that daylight hours still remained to be ruined.

One individual became somewhat vehement about the merits of forgetting warm clothes. "Some days, even in summer" he insisted, "you go around feeling like a dawn-wet November mushroom. And if that won't ruin your trip, what will?"

Interpretation of the foregoing statistics will make the observer realize why forgetting needed items was ranked first under the Poor-Plan division. Listed second was taking quantities of impractical items. One rather sad case in this area involved a hiker who was found near a trail deep in the woods.

Nearby was a packbasket containing 61 bottles of beer and a loaf of bread. The only other case of a nature peculiar enough to mention here involved several persons who started a canoe trip into the wilderness with 300 pounds of ice aboard. They refused to explain this strange behavior.

The committee was about to conclude its deliberations with the *No-Plan* and the *Poor-Plan* groups when one of their number, who took his doctorate in the field in Europe, discovered a startling new area of activity. Accordingly the investigation was reopened and a third category was established, called the *After-Plan*. The young man, who is being cited by the Academy, proved conclusively that you can still wreck your vacation in spite of the most careful plans; 4,000 pages of evidence were presented to justify this theory. You are invited to examine these case histories:

Case I: A man from Little Falls discovered that "if you go like a (censored) fox in a forest fire the first day out, everyone gets exhausted and wants to go home—the only sane thing to do in the first place." This person furnished notarized proof that this system had worked for him for 8.63172 years.

Case II: Adequate planning indicated; lists in order; vacationer placed tent next to swamp. "Insects did the rest."

Case III: No articles forgotten; trip planned downstream for minimum effort; vacationers decided as a last resort to look for poison ivy. Found it.

In concluding its report the committee stressed that it did not wish to appear optimistic, but declared nevertheless: "Vacations can still be wrecked. It requires only a little ingenuity."

—J. D. BULGER

WORKING OUT THE BUGS IN YOUR VACATION

BY DONALD L. COLLINS

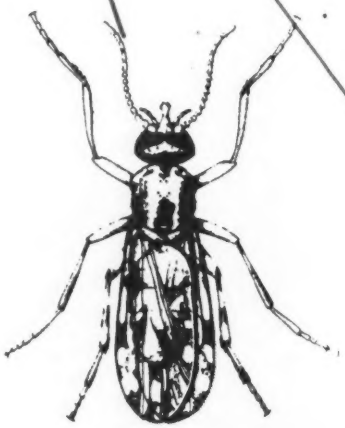
Acting State Entomologist and Senior Entomologist, State Science Service

EVERY year about this time the gag-writers and cartoonists resurrect the ancient feuds of picnickers *versus* ants, and fishermen versus mosquitoes. Students of the psychology of word association will tell you that the words "ants" and "pants" seem destined to be joined in uneasy union for as long as the English language endures. But the adoption of the letters "DDT" for the well known insecticide dichloro-diphenyl-trichloroethane was an especially lucky break for radio comics, and as soon as the open season for pests (insects, that is) arrives, it seems inevitable that many an old vaudeville act will be revived for television and given a new lease on life by injecting into it somewhere a little of the magic DDT powder. It is perhaps beside the point to suggest that many of them could do with a great deal more.

But to those of us who leave our easy chairs before the radio and television sets, to hike or fish or swim or loaf on the shores of a woodland lake, the subject of insects is far from comic. There are times when it can be deadly serious, and the presence or absence of certain insects in certain areas has often been the deciding factor in choosing a vacation time. Fortunately the day seems to be approaching when, for the majority of us, insects need no longer push us around.

Although the outdoor vacationist will inevitably run into a few of these insect nuisances, he can make his vacation days much more pleasant if he can recognize some of them, and learn how to deal with them. "How to deal with them" means, in some instances, only how to get along with them; in others, how to avoid or get rid of them. Furthermore, many persons are surprised to find themselves not minding the pests so much when they know a little more about them and the interesting habits and adaptations that so many of them possess.

Corresponding vacation areas of the several northeastern states have about the same pests in common, depending on the season, the location and local conditions. The seashore all along the coast as far north as Maine has ticks, and most of the inland states also have certain regions where ticks are relatively abundant. These same regions and also the wooded lake regions of the mountain areas have sandflies or punkies. The areas last mentioned above, where swiftly flowing streams abound, are also likely to produce blackflies. And, of course, mosquitoes of one or several varieties, dog flies and deerflies or horseflies are to be encountered practically



Sand fly or punkie

everywhere where there are the right kinds of water and vegetation, and people or animals to bite.

Taking up some of these pests in greater detail we might as well begin with ticks, since one of them, besides being a nuisance, is an important carrier of disease.

Strictly speaking, ticks are not insects, being more closely related to spiders. The American dog tick, or Eastern wood tick, known to scientists as *Dermacentor variabilis* Say, ranges throughout the eastern United States, and is also found on the Pacific coast. In the northeastern states, at least, it is locally most abundant within a few miles of the seashore. It is a proven carrier of Rocky Mountain spotted fever, which has caused local concern in widely separated, areas.

This tick passes through four distinct life phases—the egg, larva, nymph and adult stages. The adults, which are very active until they have had a chance to attack a warm blooded animal, have a habit of crawling to the tips of grass blades and other vegetation along paths and roadsides. Here they wait, grasping the grass blade with one pair of legs and with the other legs outstretched ready to grasp any suitable object that brushes against them. This object may be the coat of any medium-sized or large furry animal such as a fox or dog, or it may be the clothing or skin of man.

Fortunately, study has shown that one of the peculiarities of its hosts offers a vulnerable point which permits relatively effective control; animals, including man, usually follow rather well defined paths. This means that most of the ticks which drop off these animals fall along roadsides and paths. Newly emerged adults seem to have a tendency to migrate back to these places to await their hosts, in response to some instinct or tropism, so that a person who walks along outside a path may not pick up any ticks, while a person walking along a path three feet away may pick up hundreds of them.

Thus by the simple expedient of avoiding brushing against bordering vegetation a person may avoid ticks as he walks along a road or walks in a tick-infested area. Further, in the same way, effective tick suppression and control may be accomplished, either locally or over a wide area, by spraying the roadsides and paths with an "acaricide" or tick killing solution such as a

Tick, Dermacentor variabilis

five per cent DDT emulsion.

An attached tick should be removed with forceps which have points fine enough so that the head of the tick may be grasped close to the point where the mouth parts are inserted into the skin. A gentle, steady pulling will then usually succeed in removing the tick, along with a tiny piece of skin sticking to its mouth parts. Sometimes a sharp scalpel or the point of a knife (flamed

or otherwise sterilized) will help. The old practice of irritating the tick with kerosene or shaving lotion or the lighted end of a cigarette is not recommended, partly because it does not work well, and partly because it may irritate the tick and cause it to regurgitate into the wound.

Out-of-door vacationists are not expected to be entomologists, but they may be interested to know that most of the insects which are likely to annoy them (except ticks and chiggers, which are not true insects) belong to one great group or order, known as the *Diptera* or two-winged flies. Most of these insects are readily identifiable by anyone who takes the trouble to notice how they behave, or what they look like, although all have sucking and piercing (or rasping) mouth parts and all have two wings in the adult form. Beyond these fundamental similarities they are very different. But guests at summer hotels and other visitors to the lake and forest regions of the northeast are accustomed to sum up the whole insect situation by referring to June as "blackfly month," July as "punkie and sandfly month," August as "housefly month," and almost any month as "mosquito month."

The common housefly need not be described. We have taken them for granted for a long time, both at home and at vacation resorts, but there is really no longer any excuse for tolerating them. Although continued exclusive local use of DDT may apparently result in races of houseflies that are not so susceptible to it, other new insecticides can be alternated with DDT, or combined with it, to achieve comparable results. To benefit from the residual effect of DDT, at least a five per cent solution should be used. To get a quick knockdown on direct contact, other ingredients such as pyrethrins are added.

Above all, with houseflies, avoid the temptation to rely exclusively on fly sprays. The first and most important consideration, as with any other insect where it is at all possible, is not to allow it to breed in the first place. Houseflies breed in garbage and filth of many kinds, and elementary sanitation is the first requisite in housefly control in hotels, summer camps and everywhere else. Also, use screens where common sense indicates that they will be a help.

Dog flies or stable flies are sometimes known as "biting houseflies" because they look like houseflies and they bite. They have sharp, piercing mouth parts, adapted for piercing the skin and sucking blood, whereas the common housefly can only rasp a little and eat soft foods.

This biting fly ranges into the open

Deer fly Chrysops nigra

more than the housefly and can be very annoying to animals and man. It loves to bite unprotected ankles and is very persistent in its attempts to do so. Its maggot stage is similar to that of the housefly. It commonly occurs in horse

Black fly or buffalo gnat

manure and straw-stacks, and fermenting piles of grass, weeds and other vegetation—often in heaps of waterweed washed up on the shores and beaches, and in the piles of grass clippings from golf courses. It has been said that the female requires at least 3 blood meals for egg production, which may account for her fierce persistence.

For control, sanitation with respect to breeding places is again the first consideration, but for local control where that has been overlooked, DDT and other good fly-sprays are used. The use of repellents may also be helpful to some persons.

Mosquitoes and their habits have received so much publicity ever since they became incriminated as carriers of yellow fever and malaria that it is common knowledge that they breed in stagnant water and that the best way to eliminate them is to empty, drain, fill in, or chemically treat their breeding places. In several states there are tax-supported local governmental agencies whose sole purpose is to control mosquitoes. Their success is varying.

In New York State the only such unit officially constituted is the Suffolk County Mosquito Control Commission, which has operated with such efficiency that residents of that county and visitors to its fine beaches and parks now count freedom from mosquitoes as their "fifth freedom." Their freedom, whether it be complete, or sometimes only partial, is due almost solely to the operations of the Commission, which employs all known devices and methods for mosquito control.

Where mosquito commissions do not exist the vacationist must depend on his own resources, or on volunteer neighborhood co-operation. The fisherman who goes back into the wilderness may use repellents by day, but if he is in a heavily infested region he will do well to spend the night in a shelter (if only a pup tent) which can be closed at least by netting, and in which he can use a DDT aerosol bomb before shutting himself in. (Pocket aerosol bombs are available, and some persons use them also to give their clothing a squirt every now and then.)

Any kind of shelter, from a tent or lean-to to a cabin or an unscreened or screened porch, may be given a protective residual spray of DDT, and it is also helpful to apply such a spray to the surrounding shrubbery, tree trunks, and underbrush, and other potential mosquito hiding or resting places. Emulsions or suspensions are safer than oil solutions for use on vegetation. Emulsion concentrates of DDT or wettable powders are also frequently preferable because water for mixing them before use is usually readily available, and small quantities of concentrate will make large quantities of sprays.

The recent development of fog machines, which break up DDT and other insecticide solutions into particles so fine that they come out as a smoke or fog, has been a great service to resort operators, park commissions and hotel owners, as well as to private property owners. Many owners of small summer properties have even converted jeeps

and other vehicles into fog generators by piping DDT solutions into the exhaust manifold.

Blackflies, sometimes called buffalo gnats because of their hump-backed appearance, are much smaller than houseflies. Natives of regions where blackflies abound almost uniformly have the misconception that they breed in the leaves and duff on the forest floor, or in other similar locations on the ground. This belief probably arises from the observation that disturbing the grass and leaves seems to drive out the adult flies, which apparently hide there on account of the high humidity in such spots. Actually the larval stage of all known species is passed in running water. The larvae occur in the currents of swiftly flowing streams, often where the water breaks over rocks, or falls over or through a beaver dam, or the spillway of man-made dams. These larvae attach themselves by means of an adhesive anal disc to rocks, sticks, leaves or trailing grass in the water. If disturbed, they may spin long silken threads and then dangle at the ends of these threads, buffeted by the water current.

It is this latter habit that has given rise to the hope that treating streams with minute amounts of DDT may destroy the blackfly larvae without undue harm to the other aquatic insects which form the principal food for many fish. The theory is that since the blackfly larvae are very sensitive to DDT and are well exposed in the water currents, just a sufficient amount may be put in the stream to make them let go, and not re-attach, but not enough to harm the majority of other insects which hide under the rocks and debris. Obviously, there must be a very critical dosage balance, and until this has been thoroughly studied and tested, it is hoped that stream treatments will not be adopted on a large scale.

In the meantime expedients such as fogging and the application of residual sprays by mist blowers are affording temporary relief. In one town in the Adirondacks, DDT fogs dispersed by helicopter have been used to kill the blackflies, and this method, although expensive, seems to have gone a long way toward solving the blackfly problem where it has been used. Since the fiercest biters among this group come in June, hope is now held by resort people and vacationists alike that June can now be added to the calendar of vacation months.

In some areas the punkies or sandflies take over at the time the blackflies leave, and they are often a nuisance over a longer period and also in regions where blackflies do not occur. These are the very small "no-see-ums," which can and often do go through ordinary fly screen.

Punkies occur near the seashore as well as inland. The adults appear most often during the evening and morning twilight periods and continue to annoy after dusk, coming through screens after the lights are turned on. Coating window screens with a strong DDT solution (five per cent or stronger) will often prevent entry of these flies into homes. Where fogging or mist blowing has been done for mosquitoes or blackflies, abatement of the punkie nuisance has also been observed. Control has been reported by spraying their breeding places with DDT.

With punkies, as with the mosquitoes and blackflies, repellents should be tried where direct control is not feasible or has not been successful.

The deer flies, horseflies, and greenheads belong to a large family, the *Tabanidae*, which includes more than two thousand species. They are comparatively large, being the largest of the flies treated in this discussion. The term "greenhead" has been applied to certain common species which have large brilliant green eyes. They are often particularly abundant and vicious on the bathing beaches. The deer flies are those with black bars on the wings and often with coral red markings on the eyes. They are common along damp, sunny woodland trails and streams. Other well known horseflies are the big (sometimes an inch long) black ones which are members of the genus *Tabanus*.

All of these flies are strong fliers and very persistent in their biting attempts. Some are also known to transmit diseases. Control methods for the *Tabanidae* have not been conspicuously successful, at least not until very recently when some success has been obtained by spraying their breeding areas. The beach-loving greenheads often seek shelter in beach stands and locker rooms, and heavy residual sprays of DDT may curtail their activities. Even repellents do not work on many persons. The only saving feature is that the *Tabanids* are at least big enough to afford satisfaction when you swat them.

In closing, we may indulge in generalizations on the subject of repellents. Insect repellents have long been a standby and a necessity in the places, particularly the wilder spots, most often frequented by vacationists. Even though in certain developed areas organized community-wide control methods have been remarkably successful against most of the nuisance insects, the hardier souls will always be pushing out into the woods where Nature is still raw, and where primary control measures not only may never be undertaken, but where they might even be undesirable. Here, repellents are important.

But at this point the entomologist leaves off and the layman takes over. As far as repellents are concerned, this is one field where each individual, within reason, can be his own insect control specialist and experiment until he solves his problem himself.

DDT comes in different forms for different purposes. Aerosol bombs containing a small amount of DDT, and a knockout drop ingredient such as pyrethrins, may give a good kill of mosquitoes and blackflies which have already invaded your tent or shelter. But if you want to bug-proof the shelter against continued invasion, you should use a spray containing not less than five per cent of DDT and wet the walls, ceiling and screens with it. If you want to spray the vegetation around your camp to make everything on which the pests might rest into a hot seat for them, better use a spray made up from a *wettable DDT powder* or from a DDT *emulsion concentrate*, so as to avoid or minimize the damage to plants which might result from using straight oil solutions. Knowing the percentage of DDT in the formulation you buy will enable you to mix it in the right proportion to obtain the percentage you want for actual use.

Use your head and *read the labels*. The package, can or bottle that you buy should carry a label stating the ingredients and the percentages of each. A number of chemical companies make DDT and there are even more that put out formulations of it for various purposes; most of the preparations can be relied upon if used according to directions.

DON'T use liquid DDT preparations on your body as repellents. Repellents are especially formulated for their stated purpose. There are several good ones on the market which are safe for most people. Again, read the labels.

FLY DOPE

SOME SAY INSECTS WILL EVENTUALLY RULE THE EARTH. OTHERS SAY THEY'VE ALREADY GOT THE BEST PARTS OF IT

FLY DOPE definitely is not what it used to be. The romance is gone out of it. Gone, or going fast, is the day when a closet or a whole cabin smelled subtly of pennyroyal not just in fly time but throughout the year; when every man who affected to know the woods was his own bugdope chemist and mixed sweet scents from all over the world; when you learned that the proprietor of the local store dealing in Gen'l Merchandize had perfected a new and secret formula that would make the local brand of gnats get right down and say Uncle for many many hours, maybe days if you didn't wash too much; when you could fish and smear O'Keefe's Own Mixture, The Fly Dope That Really Works, fish and smear all day, then come home, take a shower, and still smell deliciously of O'Keefe's Own. Then you could put some of O'Keefe's own ammonia on the bites that still itched.

Now, all this is changed. The War did it. During the War what we laymen used to brew up and smear on and call Bugdope became what the scientists discovered and distilled and distinguished as Insect Repellent. Adirondack Murray's prescription of a "small bottle of sweet oil and a vial of tar" (to be mixed by the goyd) became, simply, 6-2-2.

We must be tolerant about this. No doubt the scientists meant well. They had a job to do, which was to protect a large number of G.I.'s in far flung places from even farther flung insects, which job they did, and it is probably best to give them credit for it. If, in the process, they destroyed an era and a tradition, and substituted a mere formula for individual enterprise, mass production for home industry, science for romance—then we may as well take it philosophically, shrug, and mutter C'est La Guerre. Because that's what did it—World Guerre II.

The evolution of fly dope is interesting. We have discovered, at least we think we have, that it works for two distinct reasons: it may have a *masking* effect, which means that the dope disguises the human smell and so causes the insect to look for dinner elsewhere; or it may have an *irritating* effect, which means that the insect goes ahead with his plans for dinner all right, but when he settles down on some dope-covered skin to grab off the first course he gets a sensational hot-foot and departs forthwith, sadly upset and with no further plans for eating dopey people. (More about this later.)

The *masking* principle was the first recognized. At least it was recognized a hundred years ago when the Reverend Adirondack Murray, with a conviction and willingness-to-give-forth-with-something-definite seldom found in scientists but not so infrequently in Revcrends, wrote: "All manner of insects abhor the smell of tar. When, therefore, you have need to fish or hunt or journey where they may be expected, pour out a little into the palm of your hand and anoint your face with it. I may add that it renders the skin soft and smooth as an infant's."

THERE followed the Golden Age of Fly Dope, built on the masking principle. People smelled of pennyroyal, citronella, essence of camphor, tar—but not of themselves. The bug population took it and survived.

Then came the *irritating* (or hot-foot) principle. Now then, it appears that bugs have six legs, which would seem an extravagantly large quota of legs if the bugs used them only for walking and standing around. But they use them for other things too. Confirming our poor opinion of insects in general, we find that many of them taste things through their feet, the feet on the front set of legs being favored for this purpose. So the next time you see a fly rubbing its front hands (feet) together in a self-congratulatory manner, you'll know what it's up to.

It is obvious where the irritating (or hot-foot) fly dope fits into this picture. It is further obvious that when a fly dope combines the masking and irritating principles, as many of the latest dopes do, a maximum of discomfiture, unpleasantness, foot-soreness and possibly nausea is inflicted upon the hapless bug, which is expected to retire in confusion.

It should be pointed out, however, that the bug population is far from licked in this fight. A fly dope that works for one person may not help another at all, and a dope that utterly disgusts one species of insect may appear to be just a pleasant garnishing—like a tasty dressing on a salad—to another species. Thus the insect world demonstrates a nice variety which, in view of a corresponding variety in the human world, should keep the bugdope chemists on the go for some time to come.

Also, according to an accurate count conducted by us personally, there are as many bugs as ever. DDT may have knocked off a few, but in our opinion its principal effect has been to cause the bugs to regroup and consolidate their forces in strategic areas where, with whetted appetites indicated by a great stomping of their front feet, they eagerly await your undoped presence.

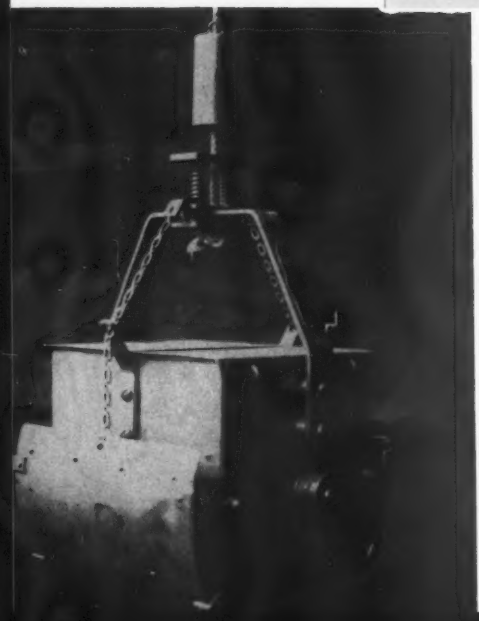
—P. W. FOSBURGH

Electric Shocker to stun (but not injure) fish needed for study. Also useful in removing coarse fish like carp

TOOLS of the TRADE

Science And Its Tools Make For Better Fishing

Water Sampler used to provide material for chemical analysis of fishing waters

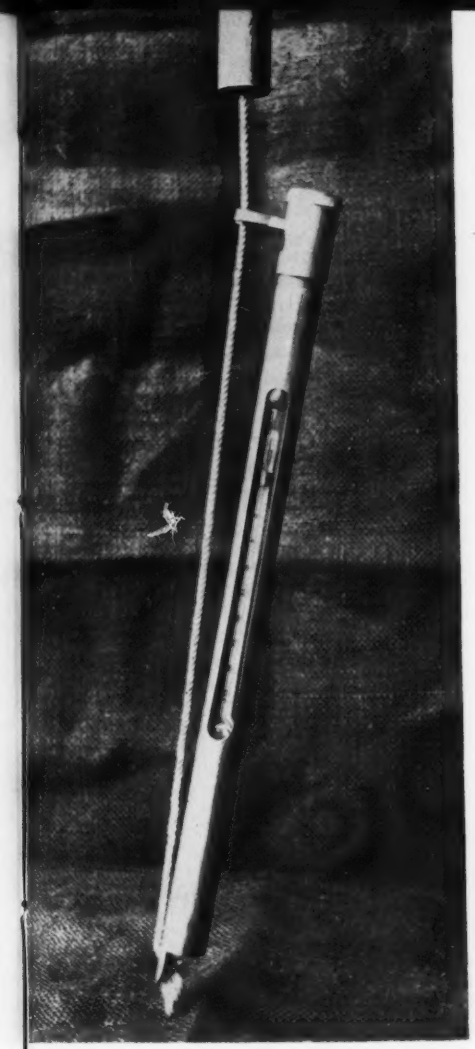


Bottom Sampler is dredge which makes possible a study of abundance of fish food organisms on bottom

OUT on the lake, well out in the deep part, a boat is anchored. But the occupants don't seem to be fishing. Instead, they can be seen lowering and raising some kind of gadget and jotting down notes in a small book. After a while they row to another position on the lake and go through the same antics all over again, until finally they have pretty well covered the lake.

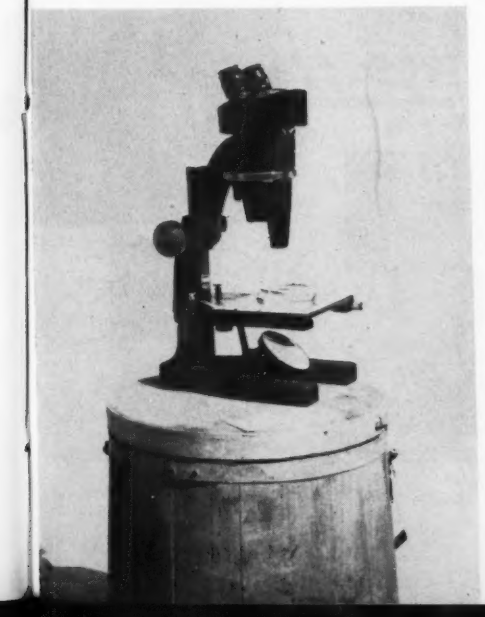
If you wait for these men to come ashore, you'll find they are aquatic biologists working for the Conservation Department, and in the boat you will see the tools of their trade.

This equipment consists of specially constructed instruments and tools that the biologist uses to measure the variable physical, chemical and biological factors that characterize each individual body of water. When making a pond survey, for instance, information on temperature and chemistry must be obtained, and two instruments are used to provide it: the reversing thermometer and the water sampler. These instruments are designed to take temperatures and water samples, respectively, at any specific depth without being



Reversing Thermometer takes temperature at any water level

The Microscope essential in reading fish scales



affected by water from any other depth. If an ordinary thermometer were used to take bottom temperatures, its final reading would of course be modified by temperatures at other levels as the thermometer was drawn up from the bottom. In the same way, an open bucket would not come up from the bottom containing only bottom water.

THIS reversing thermometer has an S-shaped kink and a constriction in the mercury column a short distance above the bulb. When the thermometer is turned upside down the mercury column is made to separate at this point. The mercury pushed up past the kink by the prevailing sub-surface temperature falls down to the tip of the thermometer, and the temperature is read at this position. Any change in temperature will no longer affect this mercury column as it is separated from the bulb and is insulated from the outside by means of a partial vacuum. (It will be noticed in the accompanying photograph that the thermometer proper is suspended within a glass tube, the intervening space is evacuated to provide insulation.)

To take a bottom temperature the thermometer is lowered to the desired depth in the reversed position, and is held there for a couple of minutes. A brass weight is then dropped down the cord, tripping the mechanism that causes the thermometer to reverse ends. The instrument is then hauled to the surface and the correct temperature read.

Water samplers may be of various designs, the one shown here being the modified Illinois type. When the lid with the attached sample bottle has been fastened to the body of this device, it is lowered to the desired depth. Water enters the center hole in the lid, flows into the bottle from the bottom of the tube, then overflows the bottle into the cavity of the sampler. Air escapes through the upwardly directed tube. After the sampler reaches a depth from which a sample of water is desired, water continues to flow into it until full. Enough water flushes through the bottle at this depth to wash out any other water that has passed into it. When bubbles stop rising from the sampler, it is full, and it is then raised to the surface and the uncontaminated sample of water removed for on-the-spot chemical analysis.

To obtain data on the abundance of fish food organisms, another item of equipment is brought into play. This mechanism is called an Eckman dredge or bottom sampler. It is a square, brass box capable of "biting out" a six inch cube of bottom material. The dredge is lowered by means of a stout cord until it rests on the bottom. A brass weight is then dropped down the cord until it strikes a release that causes the jaws to snap shut. The dredge is then hauled to the surface and its contents emptied into a fine mesh strainer. The fine particles of bottom ooze are washed away, and any large particles of material left in the strainer are separated out, leaving only animal organisms and some algae. The abundance of these organisms is a clue to the productivity of the lake in which they are found.

Always during an investigation fish are caught to be counted, weighed and measured, or examined for maturity and the presence of parasites and disease. In lakes and ponds various types of nets are used for this purpose. In shallow streams, however, a quicker and more efficient tool for taking fish has been developed—in the electric shocker. This device consists of a portable generator which puts out 220-250 volts and four to five amperes of current. It is driven by a gasoline engine and is wired to one or two movable electrodes. The electrode is usually a strip of hardware cloth with a stick fastened to each end to facilitate handling. A long insulated wire connects the electrode to the motor. The motor is grounded at the stream bank or with another electrode in the water. As the electrode is guided through the water, fish come into the electric field and are so stunned that they can be scooped out with dip-nets. The fish regain consciousness within a few minutes, and are none the worse for wear; only those needed for interval examination are kept.

SCALES are scraped from some of the fish taken with the shocker or nets. Examination under a microscope reveals that these scales are characterized by growth lines very similar to the growth rings in a tree trunk; a heavy growth line, called an annulus, is formed each winter. The number of these annuli denotes the age of the fish, and age when compared to size indicates whether or not its rate of growth is normal.

The data compiled through observation, creel census and the use of special tools are the biologist's raw materials. His appraisal and interpretation of this information results in the proper stocking or other management program designed for each body of water studied—that program which will produce the maximum amount of fish for the angler.

—JOHN GRIM, *Aquatic Biologist*

POSTWAR RECONSTRUCTION

FISH HATCHERIES

Metal rearing troughs (above and at right) supplant wooden ones. These are at DeBruce

ON these pages we present a quick glance at construction typical of the Department's program to rehabilitate and improve the State's fish hatcheries and game farms; and also a look at our work in stream development and acquisition. All this work is being done under our postwar expansion plans for fish and game, under the direction of the Engineering Unit in the Division of Fish and Game.

Financed by the Capital Construction Fund (formerly the Postwar Reconstruction Fund), this $2,871,918 expenditure will mean better fishing and hunting, improved streams and additional public fishing waters—without costing the sportsman a cent of his license money. Much of the work already has been done; the rest is nearing completion. Many of the new facilities are already in operation.

In a nutshell, the program calls for: *Fish Hatcheries:* Construction of rear-

These circular pools at Warrensburg Hatchery are typical of many built

Features of rectangular pools are durability, independent operation

Masonry work is part of many current operations

Heavy machinery indicates scale of many hatchery jobs

Concrete work to regulate water supply

FOR FISH AND GAME

ing ponds, rearing troughs and races; installing aeriating fountains, spring reservoirs, pipelines; building fences, roadways, hatchery buildings, shops, garages, offices and a big refrigeration plant (at Rome) in which to keep fish food purchased in wholesale lots at lowest market prices.

Game Farms: Construction of nursery buildings for pheasants and quail; building pens, fences, duck ponds, dams, wells, food storage buildings, shops and garages.

Stream Development: Habitat improvement of public fishing streams; construction and rebuilding of bank piers; clearing trails and footpaths; building V dams and rock pools; repairing deflectors; mapping fishing rights, laying out parking areas; erecting signs, bumper rails and stiles; and planting hundreds of thousands of willow cuttings along streams for bank stabilization and shade. —ROLAND B. MILLER

GAME FARMS

Typical range pens that can be rotated at will

Impounds for ducks are part of expanded program

No vermin can get into these quail nurseries made of concrete blocks

Each pen contains pair of quail for breeding

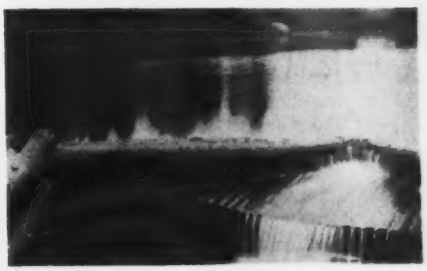
These pheasant laying pens are latest design

STREAM DEVELOPMENT

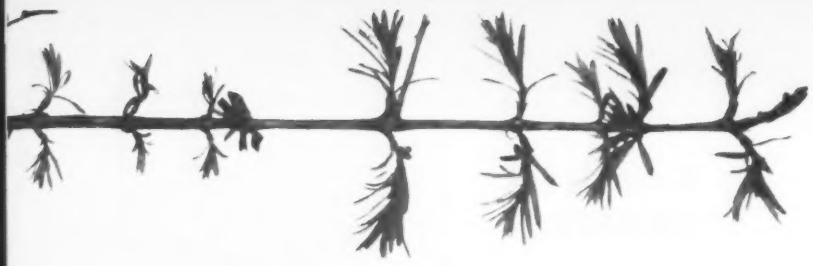
Acquisition of public fishing rights continues

V-dam typical of many that improve fishing

Willow planting (fenced against cattle) to control bank erosion and provide cover for trout



Bank pier and parking area



Metasequoia seedling starting its second year (Horizontal for editorial convenience)

On Borrowed Time

THE STORY OF THREE TREES THAT SHOULD BE EXTINCT, BUT AREN'T

ON March 18th of this year the weekly magazine, THE NEW YORKER, carried a feature article bearing the provocative title "*Where Are They Now?*" Where, now, are the Great Auk, the Pacific Sicklebill, the Wapiti, the Falkland Island Fox, Pallas' Cormorant and Steller's Sea Cow? Where, indeed, but with the Heath Hen, the Dodo, the Passenger Pigeon, and the Madagascar Tortoises; gone, says the author, along with 107 species and subspecies of mammals, uncounted varieties of birds and miscellaneous vertebrates, not to mention the lower forms of life, that have disappeared from the planet since the advent of man. All these are known to be totally and permanently extinct, vanished beyond recall, consigned to the limbo of library shelves and museum exhibits; on their way out, with remnant populations that can be counted in hundreds or even dozens of individuals are such other forms as the Australian Lyrebird, the Whooping Crane, the California Condor, and the Florida Manatee.

Nor is the end yet in sight: *Homo sapiens*, though he no longer indulges in mass slaughter for its own sake, (excepting, of course, for the periodic butchering of his own kind in wars and revolutions), will continue to modify environments, upset biological balances, reduce food supplies and generally make various portions of the globe uninhabitable for the creatures which once existed there. In addition, certain groups with extremely local distributions may be wiped out by some catastrophe of Nature, while others may decline and die out merely as the result of "phylogenetic senility."

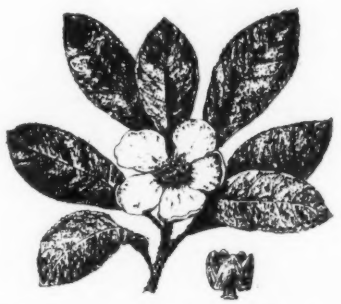
Nowhere in the article under discussion is any reference made to the plant community, except obliquely in the opening paragraph with a passing mention of the "The chestnut and black walnut." (We're not so sure the walnut isn't holding its own; at least, we ship a good many carloads of black walnut logs out of New York State every year.) The fact is, that while man has brought about an enormous destruction of plant life, especially forests, in his few thousand years of occupancy, this destruction has been in terms of *geographic areas* rather than of biological species. Whole regions have been deforested, as in east Asia and the Mediterranean lands, but few tree species, if any, have actually disappeared from circulation. Even the American chestnut, so nearly extinct, maintains a continuity of sorts, through its habit of sending up new sprouts, *ad infinitum*, from ancestral stumps. (See THE CONSERVATIONIST, April-May 1950.)

It may be that the vegetable species, particularly trees, are more durable than their faunal counterparts, and it is certain that a majority of the tree varieties on earth today have been around longer, by several geologic ages, than any of the contemporaneous animals—whether two-footed, four-footed or feathered.

What is most remarkable about the relationship of man to trees is that instead of hastening extinction, he has several times in the course of history prevented, or at least delayed, this tragedy through a process of domestication.

The classic example of a tree perpetuated beyond its alloted time is the Ginkgo, which is now a familiar sight in the parks and streets of our eastern cities. Nobody knows where this tree grew originally in the wild state, except that it was native to China; and no one in historic times has ever seen one loose in the woods except where its source could be traced with a considerable degree of probability to planted trees. This lonely representative of an ancient order, the last in a line that had its beginning among the bogs and tree ferns of the Paleozoic era, had already become "phylogenetically senile" a couple of thousand years ago, when it was rescued from oblivion by Buddhist or Taoist priests in China and planted about their places of worship. About 700 A. D. it was introduced into Japan, presumably by the Buddhists, and later found its way into England whence it has been carried throughout the rest of the North Temperate Zone.

ON the other side of the globe, a millennium and a half later, another tree species was given a lease on life at a time when it must have been on the verge of extinction. In October of the year 1765, a Philadelphia natur-



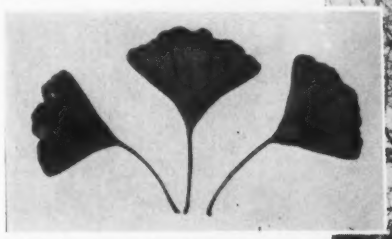
Franklinia (one-fifth actual size)

alist and gardener, John Bartram by name, was in the process of exploring some new country along the Alatamaha River (now called "Altamaha") in Georgia, about 15 miles inland from the coastal settlement of Darien. With him was his son, William, then in his 27th year. While passing through a boggy spot about two miles this side of Fort Barrington, on the northeast side of the river, old John's eye was caught by the sight of a small, graceful tree about 20 feet in height with smooth gray-brown bark and stout angular branches. Here was a new species, without any doubt, but at that time of year there was no way of telling even the family to which it belonged. So he made a note of its location, hoping to get back later at a season when the tree would be in flower.

John Bartram was 66 years old at the time, and his days of roughing it were about over. But William, who was to carry on the family tradition, did come back in the summer of 1773 to the same spot and was delighted to find the tree scattered over two or three acres of woods, in full bloom. The blossoms were startling in their beauty and fragrance; nearly three inches across, with a golden center and pure white, rose-like petals, they looked like something right out of a hothouse and it was hard to believe they were native trees there in the North American wilderness. And little wonder, for they turned out to be a close relative of the world famous Camellia. Bartram named the tree *Franklinia alatamaha* in honor of his friend, Ben Franklin.

In 1776 Bartram made a final trip to the Alatamaha, and this time he carried back seeds of the Franklinia to Philadelphia, little knowing what he was doing for posterity. For those few hundred trees in the two or three acres of swamp, along the path to Fort Barrington, were all the Franklinias in the world—there weren't any more. At least, if there were, 160 years' search has failed to reveal them. The last person to see these trees in their native habitat was a Dr. Moses Marshall, who recorded them on a visit to Georgia in 1790, (and may, incidentally have done some collecting on his own account for the nursery trade). Since that date nobody has seen the tree anywhere except in cultivation, and all the garden specimens now living are direct descendants of the seeds and young trees collected by Bartram or other Eighteenth-Century collectors.

To complete this narrative we move back again to the Orient, and forward in time to the present decade of the Twentieth Century. In February 1945 a Chinese forester, Tsang Wang, was on his way through the village of Mou-tao-chi in the mountains about 140 miles northeast of Chungking, when he found three trees of a kind unknown to him, growing by the side of a small Todee temple. The local people called it Shui-sa, meaning "water-fir." It was easy to guess where the tree belonged in the scheme of classification, for it was obviously related to the redwoods and the southern cypresses of North America. But it was different from anything ever seen before in China. Botanical specimens were sent to the University of Nanking and to the Arnold Arboretum in Boston, where the fun really began. This wasn't a new tree, after all, but a very old one—so old that it had been identified in fossil remains dating back 20 million or perhaps a hundred million years. But, until Mr. Wang stumbled onto the three specimens at Mou-tao-chi, the suggestion that living trees of this kind might still be in existence would have produced nothing more in scientific circles than a polite, academic horselaugh. Under the circumstances, the only thing left was to transfer the fossil name of "Metasequoia" to the living genus, and to invent a common or garden name for the tree. Of several considered, the one finally chosen was, appropriately, "Dawn Redwood."



Ginkgo tree (early spring) and detail of summer leaves

Later expeditions to the part of China where the first Metasequoias were discovered revealed a total of about 1,000 trees, including many big ones over 100 feet tall and some planted specimens, scattered over a territory 12 miles east to west and 27 miles north to south, between 2,900 and 4,300 feet above sea level. It must have been abundant once, for the valley where it is now most concentrated takes its name, "Shui-sa-pa," from the tree.

New Yorkers are fortunate in that at least two of the three trees now living "on borrowed time" can be grown within the State borders. Ginkgo is to be found in a number of places, with some of the best specimens in the City of Albany. Franklinia is more of a rarity, but is grown successfully in the metropolitan area and even as far north as Rochester. Up here it doesn't come into bloom much before the first of September.

Metasequoia is a different problem. Once the extraordinary nature of this tree became apparent, seed collections were made and samples were distributed far and wide for testing, mainly through the efforts of the Arnold Arboretum. The Conservation Department germinated some seeds but couldn't get the seedlings to survive outside through the cold weather. A potted seedling, however, kept out of doors last winter in a sheltered location near Albany, is still alive and vigorous as this article goes to press. So it may be that some of our younger readers will one day be fortunate enough to see a mature "Dawn Redwood" growing somewhere in the Empire State.

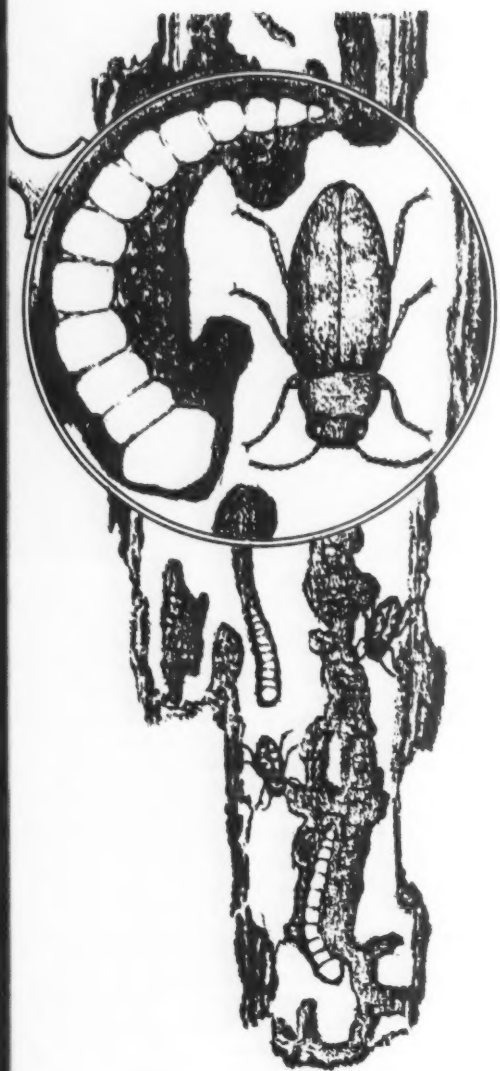
—E. W. LITTLEFIELD,
Superintendent of Forest Management

[We wish to express our appreciation for authentic source material on the discovery of Franklinia by the Bartrams which was furnished by Dr. Francis Harper, who at the present time is resident naturalist on the Edmund Niles Huyck Preserve at Rensselaerville, N. Y.]

fauna

Hemlock Borer

INSECTS, NOT WOODPECKERS, ARE DESTROYING SOME OF THE FINEST OF OUR HEMLOCK TREES



The hemlock borer and "galleries" cut in the bark

SELF-preservation, we are told, is one of the first laws of Nature. And as a result we have a continual struggle for survival, not only among mankind but also among animals, plants and trees.

To those of us who are interested in trees, there is much to learn in the fierce battle for survival now being waged on the shores of Lake George, within the area where some earliest battles for this continent were fought. Silent observers of these early marches and countermarches were the pine, spruce and hemlock trees that border this beautiful lake; they were the saplings and underbrush of Colonial days.

But today, many of them are succumbing to a deadly enemy. During the past year a most destructive insect, the hemlock borer, has been attacking and destroying many of the finest hemlocks in this area. The dry weather of the past few years together with the natural character of the soil in which these hemlocks grow has set the stage for the final and losing battle for many of these trees. The soil over much of the shoreline of Lake George is thin, with a sub-base of solid ledge, a condition which greatly retards the storage of water so essential to maintaining healthy trees. The combination of these factors—below normal rainfall and thin soil—has so weakened our hemlocks that they have fallen easy prey to root diseases. These in turn have further reduced the vitality of the trees to a point where they are susceptible to their old enemy, the hemlock borer.

The adult insects of the hemlock borer, which are metallic-colored beetles less than one-half inch long, emerge from the trees from the latter part of May until late in August and lay their eggs beneath the bark scales of weakened, dying or recently dead trees (and also in logs and windthrown trees if the inner bark is still moist). The young larvae bore through the bark, usually cutting an oblique gallery, and by the end of summer practically all sizes of borers will be present between the bark and the wood. Those that have reached their full growth usually go into the bark and construct cells in which they spend the winter, transforming into beetles the next spring. The younger larvae overwinter in their galleries.

Research has shown that the hemlock borer, which does not seem to be sufficiently aggressive to attack and kill healthy trees, certainly hastens the death of trees weakened from drought, flooding, defoliation, tramping down of the ground and other causes. If the original injury to the tree is overcome, the borer disappears.

Of late, we have received a number of letters from people who have seen woodpeckers working on hemlocks, and who attribute the sad condition of these trees to the activities of the birds. Nothing could be further from the truth; birds, especially woodpeckers, play an important role in the destruction of larvae of the hemlock borer by drilling through the bark and devouring the insects. Trunks of heavily infested trees have a reddish cast as a result of the flaking off of bark and boring carried on by these birds in their search for food.

In addition to the help given the hemlock by the birds, the Conservation Department through the Bureau of Forest Pest Control is aiding in the battle by experimenting with DDT spray which will be applied by means of a mist blower to the hemlocks still in a living condition in the heavily infested areas. This spray may reduce the number of adult beetles. In public recreation areas help is also being given by artificial watering and artificial feeding, and by disposing of heavily infested trees to prevent further spread.

WE realize that all such measures are nothing more than temporary aids and that in the long run nothing will bring the hemlocks back to health except perhaps a return to normal rainfall conditions. In the meantime we should contemplate a sad but instructive lesson; that old trees and those growing under unfavorable conditions, whether hemlocks or other species, will always be subject to various ills which younger and more vigorous trees would overcome. —C. J. YOPS, *Superintendent, Bureau of Forest Pest Control*

Hands Across

Lake Champlain

A NEW INTERSTATE COMMISSION TACKLES THE PROBLEMS OF THE BASIN

THE Lake Champlain basin is what biologists call an ecological unit. By this they mean that it is a natural geographic region throughout which—and regardless of political divisions and boundaries—there is a certain identity of relationship between environment and organisms.

But in the past this area has suffered from a divided jurisdiction which partitions the 130-mile length of the lake itself into two jigsaw pieces separated by an imaginary line. The fish don't know this line exists, and even the fishermen are hazy as to its whereabouts in certain areas. More important, the development of the entire basin —with its agriculture, its forests, its fish and wildlife, its recreational assets, travel, business and industry—has lagged behind other areas for lack of concerted planning.

It remained for the legislative committees of the two states which are charged with interstate cooperation to tackle the problems of the basin as a whole. This development was given impetus when, in 1948, Vermont played host to Assemblyman Harold Ostertag, Chairman of the N. Y. S. Joint Legislative Committee on Interstate Cooperation, and a large group of his associates. From that point progress was steady, and it has now resulted in the formation of a commission which, judging by its membership,* is well qualified to do its job. This is the new Interstate Commission on the Champlain Basin.

Chairman Ostertag appointed Senator Floyd Anderson to head the New York delegation, and the Interstate Commission subsequently elected him its chairman. Harris W. Soule, Managing Director of the Vermont Development Commission, heads the Vermont delegation and serves the Commission as vice-chairman. In general, the creation of this special commission follows much the same pattern as that which several years ago resulted in the establishment of a similar joint group for the Delaware River (*Incodel*; see page 6), a body which has already accomplished much in planning the development and wise use of the Delaware River Basin.

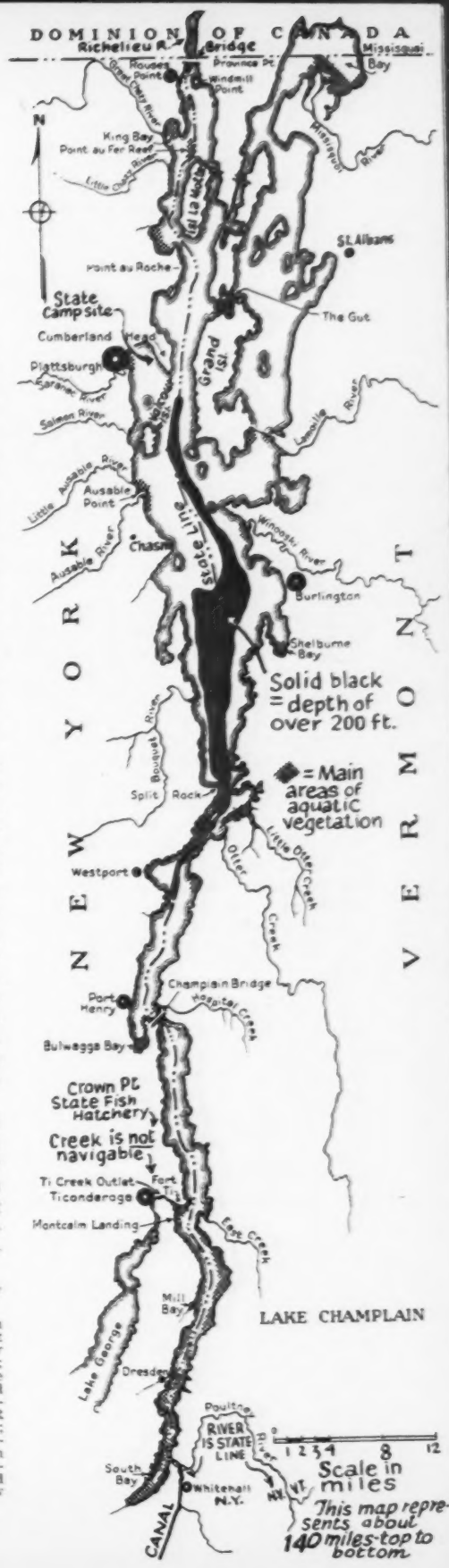
The articles of organization of the new Commission clearly state its basic objective—to foster and encourage the development of the resources of the Lake Champlain Basin. To quote specifically from these articles, its purpose is "the abatement of pollution in Lake Champlain and its tributary streams; the development of recreational areas in the Basin; the encouragement of agricultural, commercial and economic development in appropriate areas; and the conservation and wise utilization of the forests and other natural resources of the Basin."

In order to accomplish this purpose the Commission has wisely understood that it will be necessary to combine the resources of the various state agencies in both states as well as the finest leadership that can be provided from the citizens of the Basin itself. To this end it has set up a series of sub-committees composed of legislators, state administrators, state technicians and outstanding local residents to initiate surveys of the Basin's resources and needs in agriculture, forestry, pollution, mineral resources, fish and wildlife resources, transportation and communication, resorts, recreational travel, historic sites, water resources and industrial development. Any of our readers who happen to be interested in one or more aspects of the development of Lake Champlain might do well to contact one of the men listed below.

With the preliminary organizational work largely complete, the Commission and all those working with it are only now beginning to get under way in actual field studies. But an excellent start has been made, and further developments will be reported in this magazine as the occasion demands.

—J. V. SKIFF

* FOR VERMONT: State Senator Carleton G. Howe; State Representative Herbert Warden; Edward Tracy, State Sanitary Engineer; Perry A. Merrill, State Forester; Harris W. Soule, Managing Director of the Vermont Development Commission; and Philip Shutler, Commissioner of the Vermont Water Conservation Board. FOR NEW YORK: Senator Floyd E. Anderson; Assemblyman Elisha T. Barrett; Conservation Commissioner Perry B. Duryea; Health Commissioner Herbert E. Hilleboe; Commissioner of Commerce, Harold Keller; and Dr. Carl E. Guthe, Director of the New York State Science Service.



Exterior and interior views of the mill operated by The Cooperative at Cooperstown

COOPERSTOWN COOPERATIVE

BY ROBERT JOHNSTON, JR.
President, Otsego Forest Products Cooperative Association, Inc.

TO promote sound forestry, and to shore up the economic foundations of a community—both are worthy projects. Together they are the objectives of the Otsego Forest Products Cooperative Association of Cooperstown, and the cooperative, now in its fifteenth year, has largely achieved them.

By far the largest farmer-owned cooperative in the Northeast which is concerned solely with forest management and the processing and marketing of forest products, it is also the oldest such cooperative, having been organized in 1935 and incorporated in December of that year with 26 members.

Capital for starting the cooperative was secured from the local sale of stock and by a loan from the Federal government through the Farm Security Administration. Because of its national significance as a pioneering organization attempting to solve forest conservation problems, it was assisted in its organization and early years of operation by the U. S. Forest Service through the Northeastern Forest Experiment Station.

In the fall of 1940 a modern mill was put into operation three miles south of Cooperstown (at Phoenix Mills). Now, more than two million feet of lumber are manufactured annually and much of it is shipped to the larger markets throughout the East. Logs are provided by local woodland owners, of whom more than a thousand are members of the association.

After much effort the cooperative was reorganized financially in June 1947 and all indebtedness to the government was discharged. Since that time it has made rapid strides and is now firmly established as a going business. It contributes much to the improvement of local forest conditions because of the practice of selective cutting; it provides stable employment for about 45 families; and it means money in the bank and new boards on the barn for the woodland owners who bring their logs to the association's mill. Many of the members are signed up under The Forest Practice Act as well.

The latter part of last year brought an increasingly large flow of member-logged timber into the mill. Log receipts at the pond totaled 2,247,000 feet, the largest proportion of which was hardwood—ash, oak, beech, basswood, cherry and some birch. Farmer-members of the association took almost all of the softwood produced, mainly hemlock and pine, but 99 per cent of the hardwoods were shipped by truck or rail to various parts of the country. A total of 65 carloads went by train from the siding on the D. & H. Railroad at the plant.

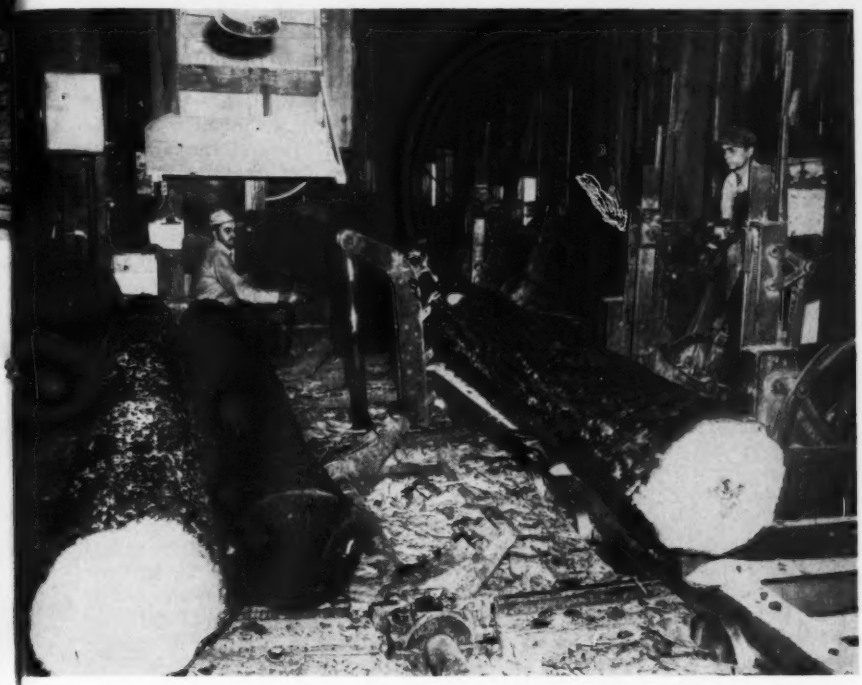
Why was this cooperative organized? Well, a cooperative, like an invention, is often mothered by necessity. Agriculture in Otsego County has been on the decline since 1880; the number of farms has decreased and, on the hill farms, erosion is prevalent. Hops, which formerly had been a source of high cash income, could no longer be profitably raised, and with regard to forest crops, the evil of clear cutting in the past was a serious threat to the prospects of woodlot income in the future. Besides these factors, there was also in the 1930's an alarming general decline in farm income, and widespread unemployment.

Confronted with these conditions, a group of farmers, merchants and citizens of the Cooperstown area decided something had to be done to conserve two of our most valuable resources—men and trees. This group, backed by the Cooperstown Chamber of Commerce, raised some $3,500 in capital by subscribing for preferred stock shares. The next problem was knowledge and experience; the men who promulgated the idea had no precedent to follow (the cooperative method of doing business in forestry was in its infancy) so they made application to the U. S. Forest Service for assistance.

THE Forest Service was anxious to help the people in their cooperative venture for several reasons. First, the program offered an opportunity to spread good forest practices to a high percentage of farms in Otsego and adjoining counties. Second, the Forest Service welcomed the opportunity to participate in the building of a model pilot mill especially designed for the processing of timber characteristically found on farm woodlots in this area. And in addition, the Service recognized that a cooperative of woodlot owners offered one way of approaching the farm woodlot management problem. Here, in other words, was a chance to study at first hand that most important reservoir of timber—the small farm woodlot.

The cooperative takes this opportunity to pay again its respects to the men of the Forest Service and of the State Conservation Department who

A Community Project shows



that it pays to get together in producing and selling wood

gave unselfishly of time and effort.

It may be of interest to present a concrete example of how the cooperative works: There was a block of maple timber belonging to a man in New York City who had been absent from the community for some time. The cooperative was interested in buying the timber, and finally received a statement from the owner to the effect that he was ready to cut his maple, and would consider an offer. Thereafter the usual procedure was followed; a field man was sent to inventory the stand and make an estimate of the timber of merchantable size so as to be in a position to make the owner an "advance" offer. The owner then had the opportunity to check this offer, and found the cooperative's figure more advantageous than he could obtain elsewhere. He thereupon entered into a standard delivery contract which itemized cutting, skidding and hauling costs, and a financial statement was prepared showing what the logs would bring after scaling and grading. With logging expenses deducted, the balance would go to the member-owner (who retains ownership of the logs until they are brought to the pond and scaled).

"Advance" estimates are always kept conservative; in this particular instance the estimate was $2,600, one half paid down at once and the other half paid at time of delivery of the logs to the pond. Because the estimate was conservative, it was found after scaling that the cooperative could allow the man $272 above the "advance" agreed upon. Needless to say, such an advantage accrues only to the member of a cooperative; had this man been dealing with an ordinary timber buyer the business would have been closed according to the acceptance of the terms in the original offer.

There are also instances in which a farmer loses a barn by fire; he needs a new frame—a whole new barn, in fact—and seeks the help of the cooperative. By trade and barter he gets his timber cut, sawed and hauled back to rebuild, selling other timber at the same time to meet the cost of rebuilding.

Other members year after year in slack time cut small amounts of timber with their own hired help, doing their own skidding and trucking to the mill and so benefitting by the elimination of these costs. Surplus timber not used by the members now is going into housing, including two big projects outside Utica.

So it can be seen that the cooperative differs from the ordinary sawmill in that the savings go directly to the members. Their woodlots are not stripped; the cooperative won't cut trees below 14" breast high, preferring to cut light every five or six years, leaving a good stand of trees to keep the woodlot productive.

Rules for grading the logs are made available by the Forest Service, and any member may have a copy. All logs are graded at the mill by the cooperative's own inspectors.

The model plant gives complete service. The logs are washed under high pressure (to conserve the saws) before being rough cut. One rig cuts to different thicknesses; another is a four-saw edger; automatic trimmers cut to desired lengths. Lumber is graded and sorted on the "green chain" before storing or going to the dry-kiln, and a planing mill finishes the lumber, tongue-and-groove, when desired. Waste goes into the plant's boilers that power its machinery.

The community's attitude toward the cooperative is best expressed in a resolution passed at a recent annual meeting which said in part: "It has furnished a stable, reliable market for our logs, no matter how few we had to sell. It raised the general price level for logs and standing trees at a time when income from woodland was badly needed by farmers. It furnishes a productive outlet for our farm labor in slack times. It furnishes us lumber at wholesale prices for farm repair, silos and other essential uses. It provides steady employment for more than 40 people. It pays out in cash for labor and stumpage about $120,000 annually . . ."

THE members of the cooperative feel that it they abide by its purpose—"to promote, foster and encourage the better care and increased productivity of woodlands, the orderly and efficient marketing of forest products, through cooperation; to eliminate speculation and waste and to stabilize the marketing of forest products"—it will continue to be of service to the farmer, to the consumer and to the State by the conservation (wise use) of our timber lands.

TROUT FOOD IN THE HATCHERY

DIET RESEARCH CUTS COSTS AND PRODUCES MORE AND HEALTHIER TROUT FOR PLANTING

AS Dr. Webster pointed out in the last issue of this magazine, insects are the natural food of trout in streams. But what about trout in hatcheries? Last year New York's hatcheries produced 339,371 pounds of trout (not to mention other species), and since between three and four pounds of food are required to grow one pound of trout, a little arithmetic will show you that we dished up about 679 tons of food to the trout in our hatcheries last year.

The traditional diet of hatchery trout is fresh liver. But reducing the cost of trout production is of major concern these days, and it just isn't economical for us to feed *only* fresh liver—or even liver that has been condemned for human consumption. We have had to find satisfactory substitutes, and that is a problem that we at the Department's Experimental Hatchery at Cortland have been working on for 15 years.

Before enlarging on our attempts to solve this problem, it should be pointed out that we are now in a position to buy foodstuffs in quantity. Under the hatchery expansion program financed by the Capital Construction Fund (see page 20), a large central cold storage plant at the Rome Hatchery and smaller cold storage units at all of the other larger hatcheries have been provided to permit carload buying at lower cost. Since our objective is to raise the most possible high quality trout at the least possible cost, this saving in the cost of food helps a lot. But it hasn't eliminated the need to find an economical and satisfactory substitute for liver.

In the search for liver substitutes two general methods of attack have been employed. One is basic research on the nutritional requirements of trout, and the other is the formulation of various diets using available ingredients and testing them by feeding experiments.

A basic research program is, of necessity, a long term project. The nutritional requirements have to be ascertained, and after they are known, ingredients selected which will supply these essentials. It is only from such a program that the nearly complete diet will eventually emerge. But such a lengthy procedure does not solve immediate problems.

An applied program, on the other hand, may supply inexpensive substitutes for the more costly ingredients, and thereby lower the cost of production immediately. By the use of feeding trials, cheaper diets may be found which can be used until further information suggests a change.

From a nutritional standpoint trout need all of the foods that we humans

require. The list includes vitamins, fats, proteins, carbohydrates, and minerals, but although they may need the same classes of food as humans, the relationship between the classes and the degree to which each class is utilized may be entirely different.

We do know they need fresh meat; when fed a meatless diet they become anemic and may die within a period of weeks. There are indications that vitamins are involved, but fresh meat will have to be at least a part of any hatchery diet until we can learn the exact nature of the anti-anemia factor or factors. Spleen has proven to be one of the better replacements for liver, but we still find it advisable to retain liver as at least 15 per cent of the diet.

One of the difficulties in discovering the food requirements of trout is that they have to be fed in the water, and it is practically impossible to determine how much of the food they actually eat and how much dissolves and is lost down the drain. In at least a few instances, however, we can beat them at their own game. Trout, as do the rest of us animals, store the B vitamins in their livers. This liver storage can reach a maximum beyond which no more will be stored regardless of how much is fed. Therefore, by running vitamin assays on the trout livers and knowing the amount of vitamin being fed, we can determine that amount which will cause maximum storage in the liver. By this method we can establish a tenative requirement for each vitamin as that amount which will result in maximum storage. This has been done for thiamin, riboflavin, niacin, pantothenic acid, folic acid, pyridoxine, and biotin.

So you see that trout need their vitamins too, although an extensive search has so far failed to uncover a one-a-day vitamin capsule which they will swallow. What a pity they aren't susceptible to progressive advertising.

Fats are found in all trout diets, but should not be present in large amounts. If over 15 per cent of the diet is fat the fish develop an edema, a condition in which the body swells up like a balloon and the cavities fill with a watery fluid. The death rate of fish so afflicted is very high. Furthermore, there is a difference in fats, there being hard fats and soft ones, each of which may be utilized to different degrees.

At least 14 per cent of the diet has to be protein. But little is known about protein quality, and about the only way the necessary information on this quality can be obtained is through balance studies. These are very complicated and time consuming experiments, but in a few more years we hope to have the much needed data that will enable us to select the proper protein.

And carbohydrates. Considerable work has been done on carbohydrate utilization, and as comparatively inexpensive carbohydrates include the sugars and starches and have the effect of making animals fat, they should be the answer to nice fat trout. Unfortunately, however, trout are potentially diabetic. In other words, they cannot use the carbohydrates we would like to feed them, and when they are fed too much of them they develop what is called a high-glycogen liver—which may kill them before a Royal Coachman does.

Finally, our knowledge of mineral requirements is limited. There is some evidence that trout remove at least part of their needed minerals from the water, and because of this it has been impossible to determine exactly what and how much they do need. It is hoped that by the use of radio-active isotopes in tracer studies, the answers to many of our present questions may be forthcoming.

As you can readily see our present basic knowledge is very meager, and we are a long way from having enough information on which to base a complete trout diet. There are many foods we would like to use and can't because of the nature of the beast, and other substances which cannot be used because they are either too expensive or are available in only limited quantities. Nevertheless, we do know a lot more than we did ten years ago.

Furthermore, feeding trials have given us many practical substitutes for liver which are being used until more information becomes available. One of the better diets consists of 35 per cent spleen, 15 per cent liver, two per cent salt, and 12 per cent each of cottonseed meal, wheat middlings, fish meal, and dried skim milk. The growth rate of fish fed this diet is comparable to that of those receiving 100 per cent fresh liver.

One of the greatest problems in the feeding of any diet is getting it so mixed that a minimum is lost in the water before the trout can eat it. In the diet listed above, the salt and spleen when mixed together form a rubber-like mass which acts as a binder when mixed with the dry ingredients. This mixed diet has the consistency of dough when mixed in an ordinary cement mixer and is easily fed to the larger fish. For the smaller fish the dough is passed through a blower which breaks it up.

When the smallest fry are ready to feed they are given a diet of liver which is very finely ground and suspended in water. This "soup" is distributed through the water with a feather, and the young fish strike at the suspended particles. As they learn to feed and become larger, spleen and then the dry feeds are added gradually, until by the time the trout are two inches long most of the liver will have been replaced. The intermediate diets that result from these gradual additions are fed with an ordinary potato ricer from which the food is extruded in worm-shaped pieces which are shaken into the water.

Many different meats and meals have been tested. Some have proven satisfactory for permanent inclusion in various diets, while others have been only good enough to become substitutes for the better ones over short periods, or at times when the supply of standard ingredients is limited. A partial list of animal meals includes meat, blood, buttermilk, and liver meal. In addition, some plant meals that may be used are corn gluten, kelp, oat, peanut meal, and bran. On the fresh meat list are heart, kidney, lung, and muscle, sometimes replaced in part by freshly ground fish. But here caution must be used, because many fish possess a substance which destroys vitamin B_1 and may result in a loss of the trout through a thiamin (B_1) deficiency.

In most of our feeding experiments the rate of growth has to be taken as the yard stick with which to measure the efficiency of a diet. To date our aim has been the largest fish in the shortest time at the lowest cost. However, there are reams of experimental data on other animals which indicates that an accelerated growth rate materially shortens the life span of the animal. This problem has caused no little concern, because if this is also true of trout we may be defeating our own ends as far as survival in the stream is concerned. Perhaps stream survival would increase if we took two years to raise a legal sized trout instead of doing it in one year. This question, too, remains to be investigated, and preliminary work is now underway. Our ultimate goal, of course, is more fish in the stream.

From this sketchy outline you can see that rearing trout in a hatchery is not as simple an operation as we would like to have it. There are multiple problems that have to be overcome before the trout eggs become fair game for the angler. But in spite of this, we do feel that we're making progress and that eventually we will be able to provide ten trout for every fisherman—instead of having the ratio reversed as it seems to be today.

—Donald R. Brockway

Scatter Shots

. . . NOTES OF GENERAL INTEREST

A CITIZEN, ALL RIGHT

On most of the application blanks for special licenses issued by this Department, there is space in which the applicant is supposed to give information as to his citizenship status. Recently it was necessary to return one of these forms because the applicant, a gentleman from Rhinebeck, had neglected to fill in this information. Whereupon the following letter came back:

"I sorry I over looked ansering the question of legal status. I aught to be a citizen of United States when my father's father brought his bride to the farm I was born. My father was also born there. My father's father was a kernel in the army and fit in the earlier wars. he was a great swardsman."

License granted.

IT'S A SMALL U. S.

District Forester Charlie Baker, who knows everybody in Chenango County, gave us this one the other day. It seems that an acquaintance of his who is in the milk business near Norwich took a vacation trip into the deep South recently. While he was walking down the main street of Montgomery, Alabama, he paused to admire a beautiful old house, and while doing so fell into conversation with a passer-by.

"You're not from around here are you?" said his new acquaintance.

"No, I'm from New York State."

A sudden interest was apparent in the other's face. "What town?" he said. "I lived in New York for a number of years."

"Norwich. Ever hear of it?"

"I certainly have. Do you happen to know a fellow there by the name of Charlie Baker? He works for the Conservation Department."

"Sure, everybody knows Charlie."

"Well, you'll be interested to know that I'm the man who got Charlie to come to work for the Conservation Department back in 1924. Give him my regards when you get back home." (The man in question turned out to be none other than Dr. Harlan H. York, now retired, who was the Forest Pathologist for the Conservation Department from 1923-1930 and continued as a consultant until 1942.

BEFORE THE MACHINE AGE

Of interest to sportsmen, particularly those curious to know how it was done before the machine age came along, are some of the pieces in the American Folk Art exhibit just set up in Fenimore House by the New York State Historical Association at Cooperstown.

Scattered throughout the five rooms to be devoted indefinitely to the exhibit will be found a splendid collection of duck, swan and crow decoys, all hand made; also a collection of weathervanes with an outdoors twist. There's one giant copper grasshopper weathervane that, if lent animation, would cause a gunner to reach for his heaviest weapon. The carved figure of an old Indian trapper, traps, ship signs, stern boards and figureheads will also draw attention.

And so will the old lawyer's office opened this season near the group of buildings comprising "The Corner" (school, smithy and country store) just across the highway at the Farmers' Museum.

TRAINING DOGS

Just to clear up a matter on which we've received a lot of inquiries:

You're not permitted to roam the fields and woods with your pointer and train it at this time of year, even though the woods and fields "belong to friends." You'll bump into Section 195, subdivision 2 of the Conservation Law if you do. Better take your dog to one of a number of special training areas in the State which have been licensed by the Department.

The Conservation Law says "no owner of a dog shall take it afield for training except from September first to April first. During such training such owner and any person in his company shall not possess afield a firearm loaded with ammunition other than blank shells or blank cartridges, or inflict any injury to animals or game birds contrary to law." The main reason for this law is obvious: to permit game animals and birds to raise their families without disturbance.

But under the terms of the law making provisions for training areas, the licensees may at any time during the year train their dogs (or the dogs of others) on such areas. And any person not a licensee may do likewise by making application in writing to a licensee and receiving a permit, for which a charge of not more than ten cents may be made.

If you're interested in training your dog on any of these licensed areas, inform the Department and you'll be furnished with the names and addresses of the licensees.

FOREST SURVEY

The State Board of Equalization and Assessment is making a survey of timber volume and growth on about six million acres of private and State-owned forest lands in the Adirondacks and Catskills. The State College of Forestry at Syracuse has agreed to undertake the field work involved, and the information will be used by the Board when it annually reviews local assessments on State-owned land in the Forest Preserve.

Character and value of State and private forest lands will be determined by use of aerial photographs. The land classification program is expected to take two years to complete and will cost an estimated $125,000, but by using aerial pictures a tremendous savings will be effected; it has been estimated that classification of the six million acres by the conventional land cruise method would cost a million and a half dollars.

The State annually pays a tax bill of about a million and a half dollars on its 2,204,436 acres of forest lands in the Adirondacks and Catskills.

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Renewal: To insure your receiving all issues of the magazine, return the renewal form as *soon as possible*. It must be in before the publication of the next issue. We can't always supply back issues.

Cash: Send cash for new subscriptions or renewals at your own risk. And please be sure that checks, money orders and postal notes are *completely* filled out.

KIDDY NOOK

By Uncle Philo Progenitive

Since many of you little folks fishing for the very first time this summer may be unintelligibly instructed by your parents, I feel that I should tell you exactly how to fish. So gather around and listen to your Uncle Philo.

Prolegomenary instructions must emphasize the promptuary effossion of annelidans, or mads, before you can be satisfactorily empanoplied. Worms are lovely bait.

Next thing is where to go. Uncle Philo prefers the pernicious, angustate anfractures of an insulous alveus, but proceleusmatic piscicapture may also emanate from illaqueating peregrinations to feral lins. Yes, Uncle Philo can tell you where to go. But you catch more fish in water.

When you have consummated your appropinquation, jaculate the impaled lubrical lumbrics subaqueously and coacervate all the fish sublated. Then coacervate the coacervations. Let me ingeminate:—Be sure to put the hook in the water because most of the little fishies live there.

There is one last itty-bitty lesson before you become an accomplished icthyophagous pseudologist (angler). Before gormandizing the fish effectuate decollation, exenteration and the sequacious rejection of recrementitious material. If you have time they will taste even better cooked.

—Larry Harper, *Lafayette*

THE 10-POUND CANOE

IF you think your experience has taught you how to "go light" on the trail, you may wish to do a quick re-take. Seventy years ago there was a man who succeeded in compressing a complete trail outfit—including packsack, ax, fishing tackle, two days' rations and canoe—into a 26 pound load. Yes, a twenty-six pound load.

This genius was a Philadelphian named George W. Sears, better known as "Nessmuk." He was a featured writer for *Forest and Stream*, predecessor of *Field and Stream*, in the 1880's. As a woodsman, his experience went back to the 1840's; as a designer of camp equipment, he really belongs to the future.

We must remember that there was no aluminum or magnesium in his day, and few concentrated foods. Down bags were also all but unknown. His 26 pound quota had to allow for a mess-kit of tinned iron and a bedroll of blankets. Nevertheless, he managed to save weight on other things.

His ax, for instance, was made to order by a manufacturer of surgical instruments in Rochester. It was double-bitted and weighed just under one pound. Including the labor involved, Sears figured that the ax cost him $10.75, no small sum in 1843. On the other hand, he notes he got more than 30 years' service out of the little tool, which makes a cost of about 30 cents per year. A fine argument for good gear in any century.

The biggest achievement was, of course, the canoe. "Sairey Gamp" is ten feet long and weights ten and one-half pounds. In spite of her seemingly puny structure, she carried her owner on more than one trip through the Adirondacks and did quite a bit of Sunday paddling about Philadelphia to boot. As we said, there was no aluminum in those days; "Sairey" is simply honest cedar, through and through.

One might note that we do not use the past tense in referring to "Sairey Gamp." She is still very much alive, though her fragile self has reposed in the Smithsonian Institute in Washington these 50 years.

Sears wrote a complete description of his canoes (he had some boats weighing as much as 17 pounds) and gear in a book named "Woodcraft", published by *Forest and Stream* in various editions between 1888 and 1900. The other gear, including the "double-barrelled ax," is also described therein.

But the real value of "Nessmuk's" work is his description of the outfit. Perhaps someday, our modern gadgeteers will rediscover the art of compressing so many comforts into a 26 pound limit.

—John Bohne Ehrhardt, *Madison, N. J.*

PLANTING RECORD

Approximately 22 million trees from the Department's nurseries have been planted this spring on State-owned and private lands. These include white, Scotch, red, Jack and pitch pine, Norway and white spruce, Japanese and European larch, and locust. State reforestation areas have taken 3,800,000 of these trees, the balance of 18,200,000 going to private landowners.

Included in the latter total were some six million evergreens of various species (set out in blocks averaging about five acres each) planted by the Division of Fish and Game. In addition, nearly a million shrubs, consisting largely of multiflora rose, were planted by this Division on about 1,500 farms as part of its program to provide food and cover for wildlife.

This phase of the planting work, now in its third year, was mainly on lands of owners co-operating with Soil Conservation Districts, but a start was made to extend the program to co-operators under the Forest Practice Act.

The Sweet-scented White Water Lily, *Nymphaea odorata*

THE subject of the colored plate on our back cover is one of the most interesting of our common aquatic plants. It happily combines the attributes of beauty and utility and is one of the most attractive of the plants in the sheltered bays and along the shallow shores where it is commonly found.

A water lily bed grows up from a twisted mass of heavy rootstocks. It might pay you to remember that these rootstocks may afford emergency footing for a capsized boatman or unwary wader. The principal usefulness of water lilies is to fish and fishermen, however, by serving as a foraging and egg-laying situation for insects and other invertebrates and, in turn, as a foraging and shelter area for fish. Beetles, caddis flies, snails, water-mites and sponges are some of the organisms commonly found on the stems and under the leaves of these plants.

Lake and pond fishermen find, early in their fishing experience, that edges and gaps of lily pad patches pay off more often than many another fishing spot. Whether the shelter and forage area provided by the lilies actually increase the production of fish is debatable, however.

Another rather special feature of pond lilies favors trout species. The same mucky bottom, shallow water situations which pond lilies like are apt to be chemically unfavorable for trout, but the shade afforded by the broad leaves tends to hold temperatures down within tolerable limits—a fact much appreciated by the trout.

The beauty and other attractive features of pond lilies for use in small ponds (trout or otherwise) have led to rather widespread attempts to introduce them into artificial ponds. Where successful these introductions have often been regretted. Even generally desirable plant or animal species can become nuisances when out of place, and pond lilies are no exception; they can take over a small pond so completely that swimming, boating and fishing become almost impossible.

Requests to the Conservation Department for advice on eradication of pond lilies are all too common. Rooted plants are usually extremely difficult to eradicate, and pond lilies are among the worst in this respect. This is due to the efficient food storage of the heavy rootstocks and also to the difficulty of applying chemicals to the thick, slippery leaves. To date the only really effective way of eradicating pond lilies is to dig them out by the roots.

So enjoy pond lilies where they occur naturally. But think twice before you plant them in your pond.

—C. W. GREENE

SALVAGE BASS

The Department's Bureau of Inland Fisheries' salvage crew operating in Mombasha Reservoir (which supplies the Village of Monroe in Orange County) recently took some pretty special largemouth bass in their nets. Four of them, weighing 25 pounds in the aggregate, were restocked in Round Lake; eight other whoppers went into Walton Lake.

The netting also resulted in the restocking in other waters open to public fishing of 5,525 pounds of bullheads, 40 pounds of pickerel and 4,125 pounds of yellow perch.

CONSERVATION CARAVAN

Patterned after the successful junket of last summer, a second ten-day traveling school of conservation will sally forth from Buffalo on June 27 to tour the Niagara country, the Genesee Valley, Allegany State Park, a bit of the rhododendron area in Pennsylvania and the shore and commercial fisheries of Lake Erie.

As last year, the caravan will be sponsored by the Buffalo Museum of Science and the Conservation Forum of New York. Co-directors and full time instructors are Ellsworth Jaeger, curator of education at the Museum, naturalist, author, artist and lecturer; and Miss Mabel H. James, field naturalist, research associate in conservation for the Museum and chairman of the Conservation Forum. Specialists of the Soil Conservation Service and the Conservation Department will be among individuals, services and organizations whose volunteer aid will enrich the course, offered by the caravan, which is a practical introduction to ecology for educators, school administrators, students and others interested.

A NEW STATE RECORD

The mammoth head above was taken by Game Protector Martin Solway near Corfu, in Ontario County, during the hunting season of 1946. Using the Grancel Fitz scoring system the head comes up with a total of 200.1 points, and so moves into the first place position held for more than 50 years by a Hamilton County head (now in the Fort Orange Club in Albany) taken by Robert L. Banks.

Among some of the significant measurements of the new record antlers are these: length of main beam (right) 28.5 inches, (left) 29.1; circumference of burr (both right and left) 8.2; greatest inside spread, 23.1 inches.

Also of interest is the fact that the dressed weight of the buck was only 146 pounds.

SKI CENTERS IN SUMMER

Visit a ski center in summer? Why not? The chair lift at Belleayre Mountain Ski Center in the Catskills (the only one of its kind in the State) is carrying up sightseers and picnickers. And at Whiteface Mountain Ski Center in the Adirondacks the 8-mile-long Whiteface Memorial Highway is attracting plenty of visitors. There's no place like it if you really want to see the Adirondacks—a lot of them, all at once.

WORK for the SUMMER

Bureau of Soil Conservation–Working with Soil Conservation Districts and District Game Managers in co-ordinating marsh development programs in co-operation with the Districts as part of PR-48-D (more cover on the land).

Bureau of Forest Pest Control–Winding up gypsy moth spraying (about 150,000 acres) in eastern New York, using aircraft and mist blower. Starting trapping to locate infestations for next year's spray work. Blister rust eradication work in Forest Districts to continue until mid-September. Investigation and determination of other insect pests and diseases. To try attacking hemlock borer at Hearthstone Campsite, Lake George, with DDT spray.

Bureau of Nurseries–Weeding and caring for millions of trees of all age classes in the nurseries, including 34 million which will be ready for shipment in fall of '50 and spring of '51. To expand Saratoga and Lowville nurseries with installation of heavy pumping units, water lines and overhead irrigation lines, construction of bagging and storage shed so that annual tree production at nurseries can be expanded to 40 million.

Bureau of Forest Management–Answering an increasing number of requests from summer residents, who own property on which there are woodlands, for assistance under the Forest Practice Act. A full-time job!

Bureau of Forest Fire Control–Collecting all firefighting equipment for repair and overhaul and redistribution to wardens and rangers. Maintenance work on fire control facilities (towers, 'phone lines, truck trails, cabins). Inspection and enforcement of fire prevention laws and extension of fire control facilities under Capital Construction Fund program.

Bureau of Camps and Trails–State's 31 public campsites open and ready for increased use; one new campsite on Long and South Islands in Lake George, three more new ones nearing completion for occupancy in August at Little Sand Point, Piseco Lake, at Rollins Pond and at Forked Lake (the latter accessible only by boat or foot trail).

Bureau of Marine Fisheries–Classifying all waters of Marine District under Water Pollution and Control Act passed in 1949; this will establish proper use of waters, and all sources of pollution violating the particular classification will be dealt with. Recreation statistics dealing especially with weakfish in Peconic Bay to be tabulated for first time since 1938; utilization of trash fish being encouraged and aided as much as possible and additional outlets continuing to be sought by Bureau. Great South Bay to be studied to learn reason for decline as shellfish area.

Bureau of Game Farms–From incubater to brooder to rearing fields; shipping half of breeding stock; haying; cultivation of crops; harvesting of wheat, completion of incubation and cleaning up incubator rooms and hatching yards.

Bureau of Fish Culture–Routine work, caring for and feeding trout, upkeep of grounds, buildings, etc. Expanded facilities to produce 365,000 pounds of fish this year. Impetus given by egg take at Constantia Hatchery from record pike run when in 12 days 4,769 quarts of eggs were taken. Last year 3,542 quarts were taken in 17 days.

Bureau of Fish and Wildlife Investigations–(Fish) Checking Fall Creek (near Ithaca) with electric shocker for Cortland Co-operative Trout Study involving follow-up of hatchery plantings reared by different methods. Summer personnel added in each Fisheries District to get surveys of lakes, ponds and streams in full swing. Field studies of potential pollution in Lake Chautauqua and Conewango Creek system in co-operation with Health Department field survey unit. Survey of reproduction of landlocked salmon. Creel census study on Bear Mt. Park lakes. To treat number of ponds with rotenone to control undesirable fish, trout restocking to follow in fall.

(Game)–Continuing study of habitat improvement on cottontail abundance. Carrying on tests of deer control measures in field crops. Continuing work with Managers evaluating PR-48-D with respect to pheasants, cottontails and muskrats. Field work on pheasant experiment areas. Study of experimental muskrat areas. Study of effect of Leucocytozoan disease on certain species of waterfowl. Field surveys of waterfowl habitat on Long Island. Observing woodcock distribution and habitat used. Continuing study of water chestnut and evaluation of control methods. Liberation of banded game farm pheasants in selected counties. Study of holding pen method of releasing pheasants.

Bureau of Game Management–Water chestnut infestation survey and waterfowl brood population survey. Operation of Conservation Education camps. Pheasant and grouse brood survey; cottontail, varying hare and skunk population survey.

Bureau of Inland Fisheries–Salvage operations continue in high gear plus emergency netting and transfer work required during drought periods. Questionnaires to go to Game Protectors for recommendations re changes in Department's tip-up order. Sale of tags for importation of commercially reared trout for food purposes at a peak. Applications for netting and stocking fish in private waters.

Bureau of Law Enforcement–The usual checking for fish and game violations. Investigating deer, beaver and pheasant damage complaints. Salvaging fish in times of low water. Aiding in pheasant survey (brood abundance). Checking on illegal training of dogs.

Bureau of State Forests–Completion of planting of 3,360,000 trees on State plantations. Continuing work of rehabilitation and development under Capital Construction Fund including truck trails, water holes, fire lines. Thinning and pruning in plantations and natural stands.

—ROLAND B. MILLER

For your Information

OGDENSBURG

Just a year ago we published in this magazine an article entitled *What Goes On In Ogdensburg?* The purpose of this article was to call attention to flagrant violations of the Conservation Law, committed within the city limits, in connection with the annual spring spawning run of pikeperch up the Oswegatchie River.

This spring the pikeperch ran up the river as usual. But we are informed that even on Fridays during the run; the diet of the local populace was canned salmon; the pikeperch were not disturbed, and no violations were reported.

The Department had an unusually large staff of unusually large Game Protectors on hand, but most of the preventive work had been done before this force arrived by Mayor Morissette (elected last fall) and his city officials. In other words, the citizens of Ogdensburg, through their elected and appointed officials, took the violations problem largely into their own hands and solved it—which, as we pointed out in the article a year ago, was what we hoped would happen.

NOTICE TO MUSKY LICENSEES

In Cattaraugus and Chautauqua counties (other than Lake Erie) special muskalonge licenses were issued to 14,392 persons in 1949. *The principal purpose of this license, for which the nominal fee of 25 cents is charged, is to afford a method of keeping catch records.* The special muskalonge law makes return of the report blank (on the reverse side of the license) mandatory, *not optional.*

If only a few anglers fail to mail in their report by October 20, the important catch record tabulation still could be figured fairly closely, but the percentage of anglers reporting in 1949 dropped alarmingly. Obviously, the muskalonge resource is worth too much to be jeopardized by misinformation regarding annual catch.

Therefore, notice is given here (and efforts will be made to give it wider publicity) that *the provision of the muskalonge law relating to catch record will be strictly enforced in 1950.* Failure to report is a misdemeanor and carries a fine of $10-$100.

If you failed to report your 1949 catch, please do so even at this late date; mail in your license, or if you can't locate it merely report the number of muskalonge caught — whether none, or the limit of five. Incomplete returns for 1949 give a catch of 6,988 muskalonge, weighing 71,278 pounds for holders of these special licenses. The average size of muskalonge taken was 33.6 inches; the average weight, 10.2 pounds. But we repeat: these figures are based on incomplete returns.

The prospect of struggling with delinquents in return of 1950 muskalonge license reports is not a pleasing one, as it will take time and money to make the check. But it has become evident that this job has to be done.

"Prevent Forest Fires"
Save Our Natural Resources and Wild Life
CLAUDE VAN WIE
FOREST RANGER
Phone 12073
SCHOHARIE, N. Y.
A MATCH HAS A HEAD, BUT CAN'T THINK. YOU CAN.
BE SURE YOUR MATCH IS OUT
TIMBER IS A CROP DON'T BURN IT

MATCHES PREVENT FIRES

The photograph above illustrates an idea hatched in the fertile brain of Ranger Claude Van Wie, of Schoharie, who believes that although matches start a lot of fires they can also be used to prevent them.

Not shown in the photograph is the inside cover of the match book. This carries advertising of local merchants, who are glad to co-operate with Ranger Van Wie and who pay the printing costs.

COYOTES, coydogs, dogotes, or what have you: hybrids taken this spring from a den in Lewis County. Note variations within same litter

The program planned for this year in the Adirondacks to meet New York's coyote control problem (see Dec. '49-Jan. '50 CONSERVATIONIST) will use three or four State-employed trappers during the months of August through October. From investigations already made, and judging by last year's experience, it is believed this period will be the most productive.

During the past winter and up to March, State trappers found that the coyotes had scattered and are now ranging extensively. Tracking to determine denning territory was not very productive because of weather conditions, which also interfered with trap sets.

Except in areas where concentrations of the animals can be spotted in the wilderness, control efforts will be confined to the belt of agricultural lands bordering the upland game range.

In addition to trapping based on reported concentrations (including those reported in landowner complaints channeled through County Agricultural Agents) trappers assigned to the western Adirondacks will give demonstrations to interested farmers and others. Such demonstrations have proven that self help can be quite effective in controlling thinly scattered populations of predators, with the landowner and his maintenance personnel filling in a gap where area and density of terrain make State trapper activity impractical.

Incidentally, despite rumors of damage to livestock by coyotes, it has been found that these depredations have been extremely slight.

KENNETH A. DEERING
Memorial Trophy

The Schodack Valley Rod and Gun Club, the Castleton Rod and Gun Club and the Rensselaer County Conservation Alliance have initiated a most worthy contest—to promote hunting safety. With this annual competition the sportsmen are honoring the memory of Ken Deering, who believed in teaching young people the correct use of firearms and who, ironically, in the fall of '48 was killed by a stranger's rifle shot in one of those hunting accidents of which we still have far too many.

Yearly a Kenneth A. Deering Memorial Trophy will go to the club which has done the most with the largest number of people, especially young people, to promote safety in the woods. Commissioner Duryea and an officer from both the State Conservation Council and the Alliance will be judges.

A club a three-time winner will become permanent possessor of the trophy. There also will be an individual prize furnished by the Alliance to the sportsman within the winning club who contributes the most to the club's program. Awards will be made at the annual convention of the State Council, which is paying transportation expenses to the winning club's representative.

The hunting accident problem is clearly a job for education. That the Rensselaer County sportsmen have realized this, and have undertaken to do something constructive about it, is deserving of high praise.

TREES IN WINTER STORAGE

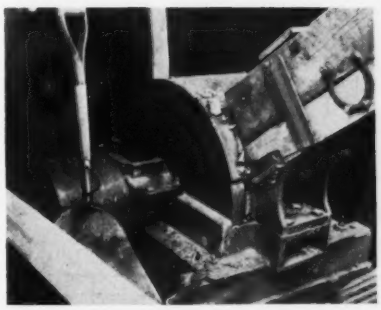
If nursery seedlings could be dug in the fall and then stored over winter, it would make for more rapid and efficient distribution of planting stock during the busy spring planting season. This would relieve some of the pressure in the spring nursery season and also furnish a supply of trees which could be shipped early in the spring to parts of the State where planting conditions were favorable without waiting for the nursery to thaw out.

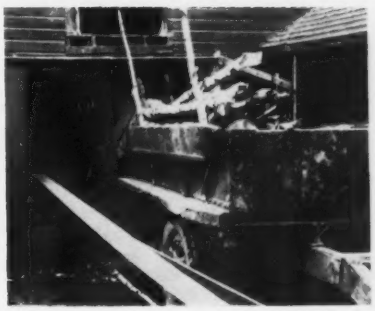
An experiment with white pine and white spruce grown at the Painted Post Nursery indicates this idea may be practical. Storage was in one of the so-called "igloos" on the Three Rivers Game Management Area near Baldwinsville, a former military establishment. The igloo, an insulated concrete structure in which temperatures don't go below freezing, is one of 14 constructed and used by the Army for storing picric acid. Trees lifted during the latter part of September were heeled-in in about eight inches of native sand on the concrete floor. They were watered twice.

A recent inspection showed the trees in a healthy condition, with tops of a normal green color and roots moist. Further inspection will determine whether or not storing the trees for so long a period without any light might cause some trouble with the needles when exposed to full light in the field.

The capacity of an igloo is estimated at a half million trees so that, with five buildings available, it would be possible to store some two and one-half million trees at Baldwinsville each year.

BEDDING FROM WOOD CHIPS





A nice fluffy mattress for bossy to lie on during her winter confinement is now being produced right off the farm woodlot from wood chips. Bedding material for dairy cows has become a serious problem in Dutchess County, especially with those who, like Pulver Brothers of Stanfordville, use a new type of mechanical barn cleaner.

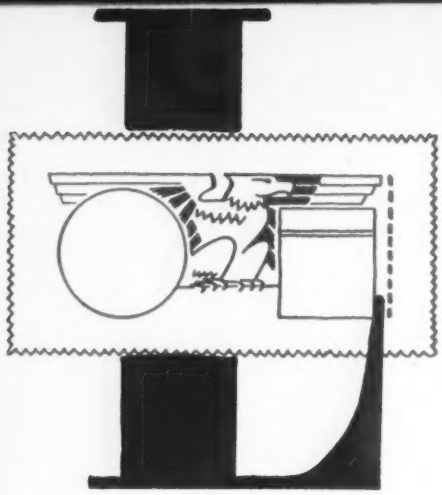
With this new type cleaner, a grating covers the drop and the cleaning is done by a spiral conveyor laid the length of the gutter. A small electric motor sets the conveyor in motion and removes the contents of the gutter, at the same time doing a thorough job of mixing. This cleaner requires a finely divided bedding material such as sawdust or peanut shucks, but sawdust is scarce here and costs around $5 a truck load at the mill.

For this reason, Bill Pulver began the serious business of investigating woodchippers. He wrote to State and Government agencies for information and checked on manufacturers. He finally settled for a Mitts & Merrill second-hand machine which will chip up a cord of seasoned gray birch in 20 minutes. The chips from two cords will bed 75 cows for three days.

Pulver Brothers have 95 cords of gray birch cut in 8-foot lengths as a result of a land clearing job. This will all be used for bedding. As time goes on, improvement cuttings will be made in the regular woodlot and run through the chipper. With around 400 acres of woods to work on, it would look, offhand, as though bossy will be assured a nice comfortable mattress to sleep on for a long time.

The writer was present when the woodchipper was in operation at one end of the stable. The aroma of cut wood was very pleasing and bossy appeared entirely happy.

The chipper described is not portable. Therefore, all material has to be hauled to it. Perhaps a lighter machine can be developed that will allow it to be taken to the woodlot, where the chips could be blown into a truck and unloaded by power. —H. G. Strait



etters to the editor

'COON FIGHT

Dear Editor: This letter is being written in reply to a letter you published (Feb.-March, '50) of S. K. Martin concerning the opening dates of trapping 'coons and the hunting of 'coons with dogs.

In his letter he stated that the 'coon hunters are the ones that are slaughtering the 'coon. Not too many years ago there were very few 'coons around. 'Coon clubs, made up of 'coon hunters, have restocked nearly 2,500 live 'coons in the last ten years. What have the 'coon trappers done to help?

A 'coon hunter hunts only a few hours at night. A 'coon trap is set 24 hours a days.

Whitney Evans, Secretary,
Western New York 'Coon Hunters'
Protective Ass'n., Inc.

Dear Sir: As to the slaughtering, how many trappers ever took a trap off a 'coon's foot so he could catch it again? Many are the times I've seen hounds taken from the tree without a kill so the 'coon could live to run some other night. Anybody knows that an accomplished trapper can kill many more 'coon in one night than any hound or pack of hounds can.

Hunting with hounds is one of the greatest of sports and the best part of it is that in these days of diminishing game supplies, we can enjoy the chase without killing the game. Many of our most exciting hunts are those that ended without a kill.

Oliver D. Meddaugh, Newark Valley

Dear Editor: He states that the dog hunter hunts any time of the year regardless of the law. That is a big statement to make and surely is good grounds to make him prove it before a Judge and Jury. He claims that no warden is going to trail around at night looking for them. I will have him know that we have wardens here that go into the woods at night, and if they ever need any help they know where to get it.

Charles H. Conklin, Suffern

Dear Editor: We disagree. The dog hunter doesn't kill the 'coon out of season because of the price of furs and the fur isn't any good. We also can't get any 'coons after the snow falls. The 'coons are destroying a large amount of crops. It is about time the dog hunter got a break.

Jim Worden, Canandaigua

Dear Editor and Mr. S. K. Martin: In 1930 if you had a $200 'coon dog you might get six to eight 'coons in one season. Now, due to restocking by our 'coon hunters (and not by one single trapper that I know of) we get 'coon every night we got out (alive for restocking).

We have two trappers that I know of around here that get 30 to 40 pelts, (no live 'coons) and those not caught in traps are taken out of the few den trees left in Niagara County.

We also have Game Protectors that are not afraid to go out at night and stop some of these game hogs who kill all 'coons that tree.

Donald McCollum, Lockport

Dear Editor: I would favor the season opening at the same time, but when he accuses us dog hunters of hunting out of season I'd like to say that no true sport would do it, especially when 'coon are not worth more than they are now.

Guy Hewes, New Berlin

● *We assume that Mr. Martin's main purpose in writing was to suggest that the season on 'coons should open at the same time for both hunters and trappers. In our editorial comment we agreed with him. But Mr. Martin went on to make some disparaging remarks about 'coon hunters, and concluded: "I would like to know what some of the other readers of your swell little magazine have to say about it."*

Well, they've said it.—Editor

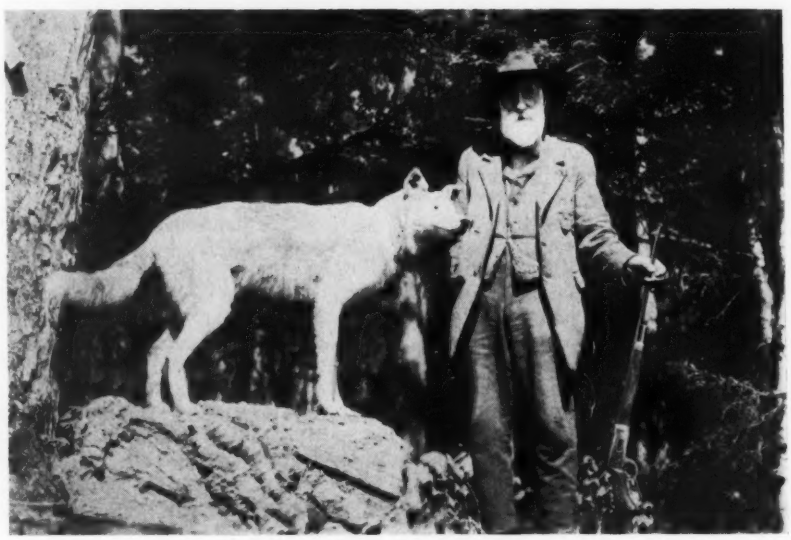
WOODPECKERS AND HEMLOCKS

Dear Sir: All fall and winter several pileated woodpeckers have been very busy along the west shore of Lake George about five miles north of the village. I have watched them a good deal and the work they seem to be doing is exclusively on hemlocks. Some of the trees they "debark" seem perfectly healthy, but within six months after the woodpeckers work the trees are dead.

Are the trees doomed before the woodpeckers arrive or do the woodpeckers kill the trees?

Smith McLandress, Glens Falls

● *The woodpeckers are giving the hemlocks a helping hand, not killing them. See article on page 24.—Editor*



REUBEN CARY AND HIS WOLF

Dear Editor: Enclosed you will find a picture of my father, Reuben Cary, and a wolf he killed. Thought it might be of interest for the magazine.

Only two of us are left of the Cary family, my brother, Frank Cary, and myself. Was very much pleased with the February-March issue and all those places in the Adirondacks were very familiar to me. Also enjoyed the letter sent in by Mrs. C. W. Wright, Jr. of New Jersey, where she told of her grandfather, A. C. Tait. My father, Reuben Cary, was the artist's Adirondack guide when Mr. Tait lived at Long Lake.

Mrs. James Flynn, Long Lake

DOGWOOD

Dear Editor: There is one point in Mr. Littlefield's article "To Pick—or Not To Pick" in the current issue of *The Conservationist* that we'd like cleared up. Is the flowering dogwood a wild flower or a tree—or both?

We contend that it is both a tree and a wild flower. If our contention is true, then the dogwood is fully protected by section 1425 of the Penal Law "on the lands of another" as well as on State, County, City, Town or Village property.

Does not the law read, "Cut down, girdles, or otherwise injures or destroys, a fruit, shade or ornamental tree (italics ours) standing on the lands of another. . . ."

What say you?

Westchester County Conservation Ass'n.,
Robert K. Ungeman, Executive Secretary

• *It is certainly true that dogwood is a tree rather than a wild flower. However, whether it is an "ornamental tree" within the interpretation of section 1425 of the Penal Law may be open to question. Mr. Ungeman quotes the law correctly to the effect that it is a misdemeanor to cut down or destroy "a fruit, shade or ornamental tree" but the use of the word "ornamental" in conjunction with the words "fruit" and "shade" would certainly imply a tree grown in cultivation rather than a wild tree, no matter how "ornamental" the latter might be in the broad sense of the word. Furthermore, the term "ornamental trees" as used in the common parlance of the nursery and landscape business certainly applies to a tree which is set out in a yard or other landscape design, and not a tree growing in the woods.*

Thus, it does not appear to us that section 1425 of the Penal Law could be invoked to prevent the cutting of wild dogwood specifically. But there are, of course, other sections of the Penal Law which prohibit stealing one's neighbors' goods, whether trees or what not.—E. W. Littlefield

MORE ABOUT WILDFLOWERS

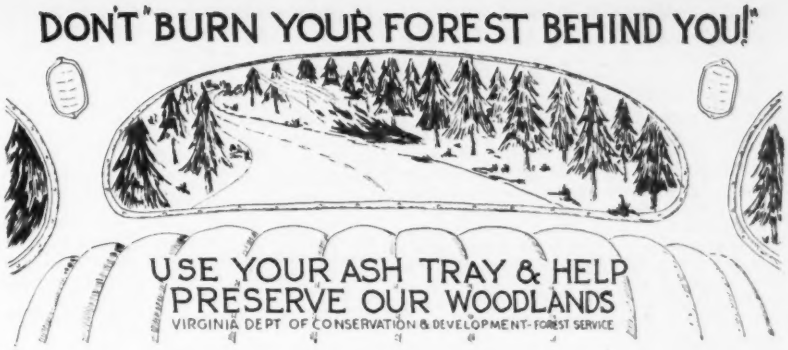
Dear Sirs: Your clear interpretation of the Wildflower Law, in the April-May *Conservationist*, will help to obviate confusion; but it may induce more unnecessary picking or uprooting of flowers on the part of those who think only in terms of prohibition rather than inhibition. The law as it reads seems contradictory, but at least it is a warning that apparently deters many from wanton destruction.

Though amended from time to time by inserting additional species, the law is by no means up to date, because the inroads of florists, nurserymen and thoughtless or uninformed individuals, are evidently hastening depletion (if not eradication) in many areas, especially near the cities. I see that exemplified by the condition in many woodlots near Albany, where the more interesting wildflowers are rare or entirely absent. Fire and grazing, and careless picking, tell the story. It is a permanent loss to everyone.

One of the worst drains is the uprooting and transplanting to gardens of any plant that strikes one's fancy. And this practice is increasing too fast to be offset by any enforceable law or by all the educational propaganda put out by our State agencies, the garden clubs, or the wildflower protection societies. You have probably noticed Frederick Houghton's article in our State Arbor Day Bulletin on "Wild Plants in Rock Gardens." He warns against this careless transplanting from the wild, and gives good advice, as to, first, carefully duplicating the soil conditions required by the plant species decided upon. Obviously, no one should remove the legally protected or other uncommon plants from their native habitat.

This last sentence is the essence of the matter. If we are really serious about the conservation of beauty, whether in plant or animal form, we must practice restriction of use in *all* areas, according to the abundance or dearth of a species in different localities. It is not merely a question of whether a species is near extinction in the State as a whole. The preservation of rare orchids in Bergen Swamp sanctuary does not suffice for me here, or for the other outdoors people, or schools and natural science agencies State-wide. We must preserve these natural assets reasonably in all areas.

Alvin G. Whitney, Assistant Director,
New York State Museum


DON'T BURN YOUR FOREST BEHIND YOU!
USE YOUR ASH TRAY & HELP
PRESERVE OUR WOODLANDS
VIRGINIA DEPT OF CONSERVATION & DEVELOPMENT-FOREST SERVICE

LESSON FROM VIRGINIA

Dear Editor: I recently put a set of license plates on a Virginia car. This picture was with the plates. Pretty good way to remind the public to be careful, isn't it?

Lloyd Stott, Saranac Lake

NEVER TOO YOUNG

Dear Editor: Our club, the Junior Civilian Conservation Club, was organized last February. We are most ably composed of 4 boys and girls of the third grade and 2 girls from the seventh grade. We recite the Conservation pledge and pledge to the American flag at the opening of our meetings. Our parents have co-operated with us wonderfully. Our work consists of various activities. We have built and set up bird houses and feeding stations. Also we have displayed "Smokey" posters in conspicuous places. We have many hikes planned for the spring and summer months. We think that *The Conservationist* is an excellent magazine. When we have enough money, a regular subscription from us will be coming. We hope to encourage other children to copy our example.

Jr. Civilian Conservation Club, Rochester

• *Good luck, and if you need any help let us know.—Editor*

MINNOW TRAP

Dear Sir: After reading my copy of 1950 Fish and Game Syllabus, it is not clear to me whether or not I can use a minnow trap in streams where trout are present. Page 8 states that minnow nets cannot be used, but it doesn't state anything regarding minnow traps.

H. P. Towner, Sr., Dalton

• *According to Section 217 of the Conservation Law: "a glass, plastic or wire trap not more than 20 inches in length having no wings or leaders and having an entrance not larger than one inch in diameter, which such trap shall bear legibly at all times when in the water the name and address of the operator" may be used in any waters of the State by any person entitled to take fish by angling in those waters.—Editor*

IMAGINATION, OR DOGS, RUNNING WILD?

Dear Sir: With reference to the complaint received from the Middle Grove Fish and Game Club that wild dogs were killing deer in the Haunts Creek—Fox Hill area of Saratoga County:

For the purpose of having a record of this complaint—which is received every year during the month of March—I am furnishing you the results of our investigation of same. This year the complaint was made to the Saratoga County Conservation Council as well as to me, and was to the effect that dozens of deer were being killed by these dogs—which stayed all the time in these deer yards.

On Sunday, March 26, 1950, we invited members of the club to investigate this matter with us. With ten members and Protectors Call and Doody, we covered all of this Haunts Creek—Fox Hill deer yards area. Spreading out about 500 feet apart we were able to make a very careful survey but after walking about ten miles, we were unable to find any tracks or signs of dogs. However, we were able to find one dead deer, a two or three year-old doe, and no one in the party was able to say what caused death. A bobcat was feeding on this deer and there were numerous tracks of this cat around in the snow.

At the conclusion of this investigation all of the club members with us were satisfied that the complaint was unfounded and false. I feel by inviting these members to see for themselves it will help us in the future in obtaining, and working on, worthwhile information.

Francis L. DuCuennois,
Asst. Dist. Game Protector, Corinth

LAKE TROUT IN ONTARIO

Dear Sir: The article on Lake Ontario compiled by Messrs Skiff, Weeks and Stone in the February-March issue of *The Conservationist* provided very interesting reading. It indicated that one of the early fish sought for was the lake trout; however, it did not elaborate on the present status of this species.

I would very much appreciate information as to the present possibility of the rod and reel fisherman locating this species of fish in Ontario waters in the vicinity of Niagara or Orleans Counties.

John M. Heuser, Williamsville

• *Lake trout are still present in Lake Ontario, but are so scattered as to make fishing for them pretty unrewarding. Most of those taken are brought in by fishermen, commercial and otherwise, who are after some other species.—Editor*

WANTED: A MAP

Dear Editor: Myself and a hundred other hunters are lost in New York State. When the Conservation Department set the dates on ruffed grouse and partridge last fall that was fine, but where we could hunt and where we couldn't was still to be figured out. I got out a Socony Road map which doesn't show railroad tracks. As this was no help to me, I inquired from fellows where I work. After talking to a number of them I was more mixed up than before I said anything. Since no one seems to know the exact location of the different railroad tracks, I'm submitting the suggestion of publishing a map of New York State in our *Conservationist* defining the territory that these tracks cover and dividing them off into northern, southern, and western zones.

E. H. Bushnell, Schenectady

Dear Sirs: May I suggest that in some future issue you include a map defining the northern and southern zones for trapping and hunting in New York State. These zones are explained on page 20 of the 1950 Fish & Game Syllabus—but unfortunately I am not a railroad man.

Bob Boorom, Batavia

• *An excellent suggestion, and something will be done about it.—Editor*

SHELDRAKES AND SKUNKS

Dear Sirs: Why does the Conservation Department prohibit the killing of sheldrake ducks and skunks? About a month ago you planted a large number of trout in the East Branch of the Ausable River in this town; this morning there are 15 or 20 sheldrakes getting their breakfast on those trout. There is open water on rapids and springs, so they have a good chance to fish.

As for skunks, who wants one? And I believe they destroy more partridge eggs and young than are killed by hunters. I am sure if I had a weasel in my hen house I would try to get rid of it.

Ezra J. Fairbanks, Jay

• *The sheldrake is protected by Federal, not State law. This Department may by order fix the open season on skunks, but gives them protection except during such season because (1) they are valuable furbearers; (2) they help the farmer by destroying vast quantities of injurious insects; (3) less than one per cent of their diet consists of game birds and eggs.—Editor*

CHECK, CASH, MONEY ORDER, PORCUPINE

Dear Sirs: Would it be possible to send in two pocupine tails and have the bounty of one dollar go to your Department for a subscription to *The New York State Conservationist?* I really enjoy this magazine and intend to subscribe. Keep up the good work.

Charles Ross, Wevertown

• *At last, we have found a limit to what we can do for a subscriber.—Editor*

RIBBING

Dear Editor: Is there some place where you could print a little friendly ribbing about our local Game Warden? The other night while pistol shooting he accidentally shot out three large fluorescent light bulbs which were suspended over the target.

Here is a suggestion: Due to the fact that Game Protector jobs are not too lucrative and also that Bob (Robert Van Benschoten) likes pistol target shooting so much, isn't there some one who will give Bob a wholesale price on 36" fluorescent light bulbs?

If this could be printed in the next Conservationist the boys down here would get a big kick out of it.

Best Regards,
The Margaretville Pistol Club

• *We are reserving space in the next issue for Bob to kick back.—Editor*

THAT LIGHT

Dear Editor: In your February-March issue there is an article by Clayt Seagears in regards light, "More Than Meets the Eye." He speaks of a pair of monkeys at a London Zoo who, when subjected to a certain light, had a terrific response. Would it be possible to find out just what type of light that was?

Ralph F. Hill, Glens Falls

• *A letter to the London Zoo brought the following answer:*

Dear Sir: The Overseer of our Monkey House says that Doctor Lucas of the Lister Institute carried out certain experiments with rays on marmosets and I believe the breeding results were remarkable. Unfortunately Doctor Lucas retired from the Institute some years ago, and I cannot trace him. However, I will consult our Scientific Director about this matter when he returns from India shortly, as he is familiar with all such experiments, and I will communicate with you again on the matter.

C. S. Webb, Curator of Mammals and Birds,
Zoological Society of London

2-MAN CIRCULATION BOOM

Dear Sir: Here are ten more subscriptions to *The Conservationist*. That makes 30 so far and I've still ground to cover.

I was one of those unfortunate persons who did not learn of *The Conservationist* until rather late; my first issue being the February-March 1949. Is there any way I might acquire any or all of the earlier issues? I'd certainly like to have the complete series.

Byron S. Roman,
208 Sixth St., Niagara Falls

• *Maybe one of our subscribers would be willing to part with a complete set of back issues; sorry we can't be of more help.—Editor*

Dear Sir: Being naturally a good guy who likes to help his fellow beings and also desirous of getting something for nothing—I have rustled up some subscribers for your magazine.

Enclosed find my check for $28 and a list of 28 names.

Clarence L. Kessler, Afton

• *We wish there were more "naturally good guys". Our offer of one free subscription for every batch of 10 additional new ones still holds good.—Editor*

IT COULD BE

Dear Sir: After reading the article, "It Ain't Necessarily So," I wondered if sometimes it should not read, "It Could Be." After reading about the fellow at the Waterport dam, who claimed to have caught a stringer of bass, it called to mind something that happened to us at the Waterport dam about 4 years ago.

My two brothers-in-law and myself were fishing at the lower end of the lake near the dam and had caught 8 nice bass; later one of the fellows caught another and tossed it to me to put on the string. When I discovered the stringer was gone, we dragged and cast for about 2 hours trying to recover our fish, but no soap.

Now if the stringer this fellow claimed to have caught was a fine chain, with a copper wire cross-bar at one end and a brass needle at the other end, it could be he caught our fish. Sometimes strange things come out of the water.

C. R. Lambert, Niagara Falls

TRANSFORMATION IN 5 STAGES

Dear Editor: I doubt if it will be of interest to you, but I have a series of five photographs showing the transformation of a lumber jack's log home on the Boreas Road, from something nearly worthless to an attractive camp. *All of the old was saved,* and yet the final appearance may look too modern for any possible use to you. However, if you would like to see these pictures I will gladly loan them to you.

Leslie W. Newberry,
South Windsor, Connecticut

GINSENG

Dear Editor: Your article on ginseng in the April-May *Conservationist* was extremely interesting. You may be interested to know that Brother Lafitau spent months in search of the plant and finally discovered it in 1716.

The Mohawk name for ginseng was Garent-Oguen, "crotched body" and this led Lafitau to believe that the Amerinds were of Asiatic origin—this in the early 18th Century—because of the similarity of Mohawk and Chinese names.

These facts are borne out by W. N. Fenton (contacts between Iroquois herbalism and colonial medicine in Smithsonian report for 1941 pp. 503-526).

Ronald M. Lanner, Syracuse

BLACKFLIES

Dear Editor: I have on previous occasions had very unpleasant experiences indeed with blackflies in the Adirondacks in the early summer. I am contemplating spending a week or two in the Adirondacks this summer and wondered if I would be safe for the first two weeks in July, in the region around Lake Placid. I would also like to know if the type of weather in the spring affects the hatching of blackflies to any great extent; do the flies last for a shorter or longer time depending upon whether the preceding spring has been wet or dry?

Henry C. Hunt, Jr., Roselle, N. J.

• *June is the blackfly month; they should be mostly gone in the Adirondacks by the Fourth of July, although they have a habit of hanging on if the weather continues wet. See article on page 14.—Editor*

COVER NOTE

Dear Sir: I am a collector of old books on the Adirondacks, and it pleased me to see the front cover of the February-March *Conservationist*. I recognized the picture first thing as having been taken from "The Hudson" by Benson S. Lossing. I also would like to have the readers who are interested in the Long Lake area know that the most remote source of the West Branch of our great Hudson is but one-half to one mile from Plumley's camp—which is of course two miles from the foot of Long Lake.

Gordon Plumley, Syracuse

• *Mr. Plumley will no doubt recognize some of the drawings used to illustrate our opening article in this issue—which are from the same book.—Editor*

MIGHTY OYSTERS

Dear Editor: Somewhat over a year ago while clamming in Moriches Bay, L. I., off the Speonk Yacht Club, Walter M. Gordon of Eastport brought to deck an oyster 10½ inches long; 4½ inches wide; 4 inches deep; 3 pounds weight. Early this April in the same waters, this time off the yacht club at Remsenburg, Gordon tonged an oyster measuring 10 inches in length; 4 inches in width; 3 inches in thickness; 2½ plus in weight. When the occasion arises that bigger and better oysters are desired, call on Gordon. Incidentally, from the markings on the shell the latter oyster was at least 20 years old. Oysters are scare in Moriches Bay; this one was a survivor of the 1938 hurricane which all but wiped out oysters in Moriches Bay.

Leonard F. Wooster, Merrick

COCK ROBIN

Dear Sir: This morning while sitting at home I heard a strange "bang, bang, bang" coming from the cellar. I went to the cellar and there, to my surprise, I saw a male robin, sitting outside on the cellar windowsill and pecking on the pane as if he were determined to get inside.

Have never heard of a robin doing this sort of thing and would appreciate any information you could give me about it.

Katherine Farrell, Utica

• *It's just a guess, but maybe the robin saw himself reflected in the pane of glass and thought it was another male robin. Lots of males don't like competition in the springtime.—Editor*

DEER DAMAGE TO AUTOS

Dear Editor: Not a week goes by but one picks up the newspaper and reads of an auto accident caused by a deer.

Having been a victim of such an accident and having had to pay the cost of damages to my car since insurance does not cover such accidents, I have been wondering if the State, which makes game laws, also should be responsible and pay the cost of some of the damage caused by game such as deer.

Felix A. Scardapane, Hopewell Jct.

• *The State Court of Appeals has held that the State is not liable in such cases.—Editor*

FISH & FLOWERS

Dear Sir: I think a reader census would show us ladies high on your reader list.

The fish color plates on the back of *The Conservationist* have been going on for some time now. Pretty—but I, for one, have gotten a little tired of them. Why not attract the female contingent a little more by running color plates of the State flowers, such as the Trailing Arbutus cover of April-May 1948.

Mrs. David H. DeHaven, Schenectady

• *Yes ma'am. But we may go back to a fish or two any time.—Editor*

TRADE

Dear Editor: Encouraged by the success of the "clearing house" now operating in the Letters to the Editor section of your good magazine, I would like to offer the following trade to any of your readers that may be interested: *Will trade*—Either of Sections 1, 3 and 4 of The Adirondack Map Edition of 1928, compiled by The Conservation Dept., unused and in good condition. For: A good copy of Section 2 of the same Adirondack Map.

Spence J. Johnston, Elizabethtown

NOTES FROM A CATSKILL PHOTOGRAPHER

Dear Sir: At the same time (approximately) when Stoddard was photographing on Raquette River, I was doing the same on the Neversink, equipped with a Mustang, covered butcher's wagon for a dark-room, and using the now obsolete wet plate. It is a far cry from the Ferrotype of the seventies to the color work of today.

I am enclosing a print from one of those negatives made in 1882, of Neversink Falls taken from the old stone bridge at Fallsburg, my birthplace and habitat until I was twenty; I still have the plate. A few years after, a flood swept away the east approach to the bridge and the road down to the arch on that end. In repairing it, (with rocks and stone galore in sight), those huge rocks in the right of the picture as you view it were blasted out and used for filling, leaving the gorge a shambles.

For years I furnished various publications with material for illustration, and for six years was official photographer for the Erie R.R., doing scenic work exclusively. I have covered the counties of Rockland, Ulster, Orange and Sullivan pretty thoroughly; I retired four years ago after 66 consecutive years in photography, but I still keep a small camera and a press-card handly, just in case.

Now, at ninety-one plus, my activities are confined to photo coloring, writing and easy fishing.

A. P. Davis, Binghamton

• *Thanks for everything, Mr. Davis,—and good easy fishing.—Editor*

PHOTO CREDITS

Second cover, pages 8, 9, 33, Doug Finch; 10, N. Y. S. Museum, Department of Botany; 14, 15, U. S. Bureau of Plant Entomology and Quarantine; 18, 19, Southern Fisheries District, Conservation Department; 20, 21, Fred Chambers; 22, Earl McGuirk; 23, Ed. Huber; 26, 27, Otsego Forest Products Cooperative Asso., Inc.; 28, Donald R. Brockway; 32, Monroe Fish and Game Club, Finch; 34, McGuirk, Clayt Seagears; 35, H. G. Strait.

From original painting by J. J. Audubon

GNOME OF THE NIGHT

"FOR Who May is Concerned" the letter began. "What is this thing please? Sunday I walking in woods back my place and hitting trees with stick I carrying for enjoyment. Presently I hitting one big tall dead tree used to be tulip and for suddenly things wizzing by me all 57 points compas. Things around big as bannana only not shape like that. Maybe 20 those things. I don't see any more after they wizzing by."

We wrote the guy his things undoubtedly were flying squirrels and he wrote back to quit the kidding. He knew a squirrel when he saw one and those weren't squirrels and besides his "boys have their tails on their handel bars."

Flying squirrels are very interesting. To dig up stuff on them you must go deep inside the outdoors. Although they may be by far the most common squirrel, at least locally, very few persons have ever seen one. They go for night life 100 per cent, are as elusive as short-circuited fire flies and seldom are still long enough for a good moonlit look. Besides, things often look different by moonlight.

Of all the woods creatures, the flying squirrel is the most elfin, both in appearance and temperament. We wouldn't be surprised if the Dwarfs with the big hats and long beards who formed the first American Bowling Congress down in Sleepy Hollow were flying squirrels. They'd be up to tricks like that. Anyway, their versatile tails *could* have looked to Rip Van Winkle (in his condition) like hats and beards. Flying squirrels wear 'em either way on occasion.

New York is blessed with two kinds of flying squirrels—a big one and the more common little one called *Volans*, from the Latin verb to fly. Volans is about nine inches long, half tail, and occupies the eastern half of the United States. The big one is a foot long and ranges south from Canada into some of the border states. It is called *Sabrinus* from its type locality some place in Canada. We've never knowingly seen Sabrinus.

Flying squirrels have several litters a year, often beginning in late March. At birth the young are red and naked with their prominent loose folds of skin from wrist to ankle making them look more like bats than squirrels. The general effect is that of a very small, wrinkled prune about to take off like little Myrtle rigged up for a Fourth Grade Butterfly Dance. Their eyes don't open for a month.

The tail is unique. It is very flat with a parted-in-the-middle, well-barbered appearance. The edges are even, as though sheared. Its usefulness is amazing. The squirrel can move the thing in any direction and can use it as canopy, air mattress, quilt, fencing shield, rudder.

The loose skin extension makes Volans a character which all other critters of the woods must envy. It enables him (1) to glide 150 feet or more, depending on the height of take-off (see front cover for gliding position) and (2) to indulge in the world's most luxurious stretch.

Volans is remarkably agile, probably more so than any other American arboreal creature. He can run straight up a cement wall or dangle by one hind toe. On short leaps he doesn't bother to unfold but when he wants to cover, say six feet with a rather flat trajectory, he sometimes screws his tail around like a propeller. This may be for better balance but it seems to us that the action definitely is propelling.

The flying squirrel apparently prefers vegetable food but he eats anything—flesh, fish or fowl. On occasion the mother squirrel even will eat her own young, incidentally doing a neat skinning job in the process. Like virtually all squirrels, Volans seldom passes up a meal of good raw bird.

Of particular relish are insects—and in very great quantity. The picture shows Volans reaching for one of the long-legged crane flies. When he was drawn, this particular squirrel had consumed within one hour, six large beetles and one hawk moth, the insides of four raw asparagus butts (the part you don't cook) and several lima beans.

Obviously, Volans is a prodigious feeder. He is an even more prodigious drinker. In the wild, he is never far from water. In captivity, one squirrel drank two jiggers of water in a single night. The equivalent consumption for us would be just about two gallons.

All this seems to indicate that Volans burns up energy fast. He does. All night long, except when eating, he is constantly in motion—violent motion. In captivity, he'll turn a "squirrel wheel" for hours on end. Or he'll join in community play—jumping, occasionally doing a clean back flip, wrestling, scurrying under leaves, popping up with all four legs in the air and doing sundry other buzz-saw gymnastics that would make a red squirrel look like a three-toed sloth in deep thought.

Volans is indeed the gnome of the night. His spirit definitely is elfin. It's hard to believe that such enormous exuberance could be wrapped in so small a package. It is easier to understand why the timeless processes of evolution should put flaps on this particular creature and let such comparatively earth-bound forms as the vibrant red squirrel get along as is. Volans, it seems, just *had* to go places. The red squirrel probably had to, too; but he didn't try getting there as hard.

No animal is more gentle. Reach into a hole in a tree. If you get bitten, it's something else—not Volans. Wild ones seldom bite, and when they do, it's often nothing more than a nibble. In fact, this unusual creature actually seems to enjoy human company. He usually becomes tame in a week or two. After that, he shows definite preference for sleeping places which often may be the pocket of a coat or shirt—and, what's more, while Man is in it. Curled in a tight ball, he'll ride there all day apparently unperturbed by most any amount of jouncing.

ECONOMICALLY, the flying squirrel tribe doesn't seem to be much of a factor in Man's scheme of things. Further, the chances even of seeing a flying squirrel are very remote. Yet there might be a thousand within a mile of your home. But it's a safe bet that if water is near by and big trees with holes in 'em and arc lights where the June bugs buzz, you'll see Volans if you watch closely. But what you'll see probably will be only a gliding shadow.

Or if you knock on the door of dead trees when you walk in the woods, you may see him, too, dozens of this gregarious elf—whizzing by in 57 different directions—and then vanishing. And then if you listen *hard* enough that night, maybe you'll hear way off the clicking of Rip Van Winkle's ten pins and you can imagine the bowlers with funny fur hats and long beards—and very large, black eyes.

—CLAYT SEAGEARS

GNOME OF THE NIGHT FLYING SQUIRREL

SWEET-SCENTED WHITE WATER LILY

Nymphaea odorata

(See page 32)

Courtesy N. Y. State Museum